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EDITORIAL.

AN EFFORT made at Johannesburg by a mining engineer to restrain a diamond prospecting company from publishing a garbled version of his report was unsuccessful, the justice deciding that he had his remedy by means of a civil action. However, the effort resulted in advertising the fact that the report had been mutilated so as to convey a misleading impression, and it is likely therefore that the reputation of the engineer will have been protected. Such instances are not uncommon and mining engineers do well to defend themselves and the public by taking steps to prevent the perpetration of fraud.

THE CHIEF of the Mining Bureau of the Philippine Islands is advertising for an economic geologist, as will be seen in another part of this issue. It affords an opportunity to a young man of energy and ability to achieve legitimate distinction, as the head of a geological reconnaissance the main purpose of which will be the investigation of the stratified economic deposits of coal, iron, clay, etc., in the Philippines.

ON ANOTHER page we quote at length from one of those philosophical and deeply suggestive addresses which Professor Joseph W. Richards, of Lehigh University, has the happy faculty of delivering. The production of half a ton of silicon at the moment when that element is listed as a rare chemical at so many dollars per ounce does indeed happily illustrate the revolutionary character of electro-chemistry. The chemist is to the metallurgist what the prospector is to the mining engineer, he adventures into unknown territory and wins new country for exploitation; only in his case the greater scientific acumen is apt to be with the pioneer rather than the exploiter.

AT THE PRESENT time the first importation of Chinese laborers is expected at the South African ports, and the mining community at Johannesburg is hopeful once more of a new stimulus to industry. The preparations for the landing of the coolies are more complete than those made for the arrival of troops during the

recent war. They will be medically examined, quarantined for a few days, their papers put in order and then entrained for the Transvaal. Each train will hold 300, and every care has been taken to ensure proper rationing and concomitant cleanliness. They will be detrained on the mine sidings and go into the compounds prepared for them. It is confidently expected that the experiment will prove a success and will give new life to the mining industry of the Rand.

THE KEEP-IT-DARK mine at Reefton, in New Zealand, paid dividends last year, making $2.50 profits per ton from the exploitation of a 6 dwt. gold ore. Such a result warrants a reorganization, reconstruction and re-naming of the company, with the title Make-it-known Gold Mining company. There are so many companies, especially a large consolidation operating in Wall Street and at Butte, which ought to take the name of this honorable little antipodean enterprise, that we are impelled to note the inappropriate christening. We remember another profitable little Australian mine called the Shouldn't Wonder, at Bright, in Victoria. Here also was a name more suited to nefarious schemes than to the plain digging for gold without any eye to stock exchanges. The Chinese give temporary names to infants and give them their proper cognomen when they are old enough to have developed character. Something of the sort in company nomenclature would aid the timid investor.

THE MATTER-OF-FACT work of sampling is again the decisive element in a serious mining fiasco. We refer to Le Roi. It appears now that the discrepancy between the mine reports and the smelter returns is traceable to incorrect results obtained from a so-called automatic sampler. All statements for several years have been based on samples taken by this machine at the mine—at Rossland. Every smelter manager has objected to this procedure, but in vain. Finally, a modern Vezin sampler was installed at the smelter—at Northport; and this kept the smelter work straight. Shortly afterward a careful test was made between the sampling at Rossland and Northport, and it was demonstrated that the mine results were $1 to $1.50 per ton too high, simply because the sampler at the mine took an undue proportion of the fine ore, which contains the gold in close association with chalcopyrite. It is also said that there was some tampering with the mine samples by subordinates whom Mr. Parrish had good reason to trust. When the whole incident has been investigated it will be found that the ore produced by the mine has been overvalued for nearly four years and that explanations are needed from the management in London, as well as at Rossland.

The lesson of the fiasco is again the emphasis to be put upon careful, conscientious and scientific methods of sampling at mines, whether by examining engineers or managers. If Le Roi serves to teach a lesson which will be heeded, then the unpleasant results will not have been altogether without usefulness.

TO THE MINING GRADUATE.

At this season several hundred young men will be sent out from the various technical colleges to begin the career of mining engineer. Many of these will have gone through a course of instruction which represents the best that the educational facilities of a great country can afford at this time, and this means unquestionably advantages far superior to those obtained by the men who have already won their spurs in professional competition. What use will they make of it? Will they cease forthwith to be students and, losing the finer edge of a trained intelligence, part with all the benefits of a good start? Or stimulated by the wider competition of the great arena of life, will they follow up their advantages by the further acquirement of an enlarged experience, so that the race will be run full-chested and strong, unto the very end?

It is not within the province of these columns to indulge in sermons, but to any one of sensibility there is a certain solemnity in the launching of so many young lives, and this is heightened by the pathos of that persistent disregard of experience which characterizes mankind; for it is obvious, that if we could but avoid the pitfalls which caught our fathers and if our sons avoided the places of stumbling which had tripped us, humanity would be saved from a vast amount of blundering and sorrow. Therefore, advice does not go far; and the less there is of it, the better it may be remembered.

The amount of knowledge indicated by graduation from a school of mines is quite small and does not measure the value of the three or four years of instruction; it has been a training *how to learn*, an education of the mental faculties so that the young man will observe carefully, record accurately and infer logically. The great school of mines is in the field of practice, at the mine and mill, at the smelter and the cyanide plant. It is the first five years after college that determine the capacity of the graduate and his chances of professional success. At the school of mines he was taught how to learn, in the field he actually begins to learn at first hand by getting alongside of the facts themselves. An engineer is not made by lectures and demonstrations, the seal of experience must be set on his diploma and he does well who endeavors so to utilize the first four or five years after graduation that his experience becomes broad in character and thoroughly assimilated, with the purpose of rendering his work useful to himself and to the community.

THE AMERICAN MINING CONGRESS.

President Roosevelt has appointed Messrs. James Gayley, John Hays Hammond and the Editor of this JOURNAL as delegates to the meeting of the Mining Congress which meets at Portland in August. It is probable that each of the three gentlemen designated will attend, largely as a matter of courtesy to the President and also because it is recognized by them that the mining industry of this country needs an organization through which its wants can be made known. Whether the one now existing will meet that want is a matter still open to doubt, but the benefit of that doubt should be given to the American Mining Congress because it is better to build up than to pull down. So far, the Congress, with its awkward and pretentious title, has been a failure; it has not attracted the active support of any considerable number of representative men and some of them, who did try to pull the wheels over the rough places, have desisted from their efforts. The president of the organization is much respected and he has enlisted one or two like himself in trying to make the Congress a useful institution. But as yet the results are meager. The attendance has been small and not representative; the motive force appears to have been too much the mere agitation for the creation of a federal department of mines with a cabinet minister at its head, and tagged on to this there has been the booming of the different districts in which the Congress has held its successive annual sessions, together with affording pseudo-experts the opportunity of getting notoriety by reading papers which would not be accepted by recognized technical societies. A mere handful of men have posed as spokesmen for a great industry; out of the couple of thousand delegates appointed in various ways, not ten per cent have attended; such statements have been made as "the chief executive of every State and Territory in the American Union, and the most distinguished men of this and other nations are expected to attend"—and they did *not*. These facts may as well be recognized at this time; and having faced them, there comes the question whether the organization is deserving of support. We have been opposed to it, as not representative, as a mere agitation for an official and offices at Washington, as a safety valve for half-baked process-mongers and self-styled experts, and all the time we have clung to the hope, strengthened occasionally when such men as Charles W. Goodale, E. R. Buckley, E. W. Parker, W. H. Weed and others, have taken a part in the proceedings, that eventually out of this poor beginning a forceful and useful representation of the mining men of this country would be evolved. We hope so, still recognizing, however, that a wider support and a support of quite a different kind must be secured before any usefulness can be attained.

The mining industry of this country as a

whole needs an organization to watch its interests in matters appertaining to the mining laws, land surveys and such control of companies as will protect the investing public. We hope that the existing association of mining men will set to work earnestly to carry out this purpose; and if not, then some other association ought to be organized.

SUPERSTITION AND MINING.

We have heard of individuals who were guided to the discovery of rich veins or advised in their investment of capital in profitable mines by dreams, spiritualists or some other form of that mysticism under which modern men and women cover their ignorance of the things outside their current philosophy. But these are rarely spoken of with boldness, they require an apologetic tone, and the man of affairs is prone to put them aside among the absurdities which fringe the domain of pseudo-science. In the Orient, however, they do these things better, and in China, a country now interesting as a field for future mining activity, it is a fact that the necromancer and the mining engineer find themselves face to face.

In China the religious superstitions of the people are an organized force and all mining operations have to take count of it. The spirits of fire and water, which are especially dreaded, are expressed by the superstition of Fang Shui, whose guardians are the necromancers. An American mining engineer who had charge of mines controlled by Li Hung Chang was compelled to cease underground work because the provincial necromancer reported to Pekin that the mining operations disturbed the slumbers of the dragon that lies coiled around the Imperial tombs. A douceur of 50 taels would have 'fixed' this gentleman, but the Chinese director overlooked this detail and so all work ceased. In this way the necromancers have the veto, for, though large sums may have been spent on a mine, the dictum of one of them can stop everything; they appeal direct to the throne, over the heads of the viceroy and military governor. This unpleasant custom finds no recognition in the regulations covering foreign concessions, but it exists as an unknown quantity capable of causing extreme annoyance, if not worse.

In Korea similar superstitions exist, as is indicated in a humorous manner by the incident related by another American engineer elsewhere in this issue. At one of the mines of the British and Korean concessions, so many accidents had occurred that the native overseers petitioned the manager to engage the services of a sorceress who could preside at a feast to be prepared for the devils that were held responsible.

From these miserable obsessions it is a far cry to another incident known to us as having occurred at a mine in Gilpin county, Colorado, where the Cornish miners employed underground were accustomed to meet each morning just before work in an old stope, for the purpose of holding a prayer meeting to ask the Father of All to protect them in their dangerous labors. Religions come and go, but religion remains.

AN IMPENDING STRIKE IN ALABAMA.

According to our Birmingham correspondent, a strike of the Alabama coal miners affiliated with the United Mine Workers is expected on July 1, when the present contract between the coal operators and the miners' union expires. The miners have already held a convention and determined what they will demand; from reports it seems likely that they will ask for a continuation of the present wage scale for three years, with possibly some unimportant modifications in the scale. They probably have no idea that the operators will grant the request without a struggle. The present scale was settled last year by an arbitration board representing miners and operators, with Judge Gray as chairman, after a strike that lasted from July 1 to August 1. The board's decision was naturally a compromise. Among other things, it advanced miners' wages 2.5c. per ton, an increase originally offered by the operators, but reduced the price for heading work in some cases. At the hearings before the board a lot of testimony was offered on the cost of mining coal and of making pig iron, the coal mining scale being based on the selling price of iron. It is not likely that either side was wholly satisfied with the decision of the board, or will be urgent for arbitration this year.

With the iron and steel trades dull and the prices for Alabama iron at the furnaces nearly $6 a ton lower than a year ago, both the miners' wages and the furnacemen's profits have been reduced, but the latter have suffered most. Doubtless the big iron companies which control coal lands feel that as coal miners in the great bituminous fields of Pennsylvania and of the Central West have had to modify demands made in convention and take less, so also should the Alabama miners be prepared to make concessions. The advantages now are certainly with the operators. Alabama is hardly a State where political influences can be invoked in a labor dispute, and one experience with arbitration may have been enough. As to the outcome of a strike, it must be remembered that at least one-fifth of the State's coal output is mined by non-union labor or by convicts; hence no total suspension of production is possible, and the State authorities will likely discourage attempts at intimidation and violence.

Unable to rely on aid from weak and temporizing politicians, afraid of the labor vote, kept from intimidating non-union men by starting such a rule of mob law as disgraced Pennsylvania in 1902, and powerless to interfere with the operation of mines using convict labor, the United Mine Workers, in the event of a strike, will face a difficult situation. If the iron companies which control most of the coal mines affected act in harmony and refuse to compromise, the struggle may be prolonged, but the end should be certain. In Colorado the mine workers have lost their fight against an iron and steel company. A long strike in Alabama would probably break their rule in that State as well.

MARKET CONDITIONS.

June 22.

The metal markets during the week have shown a slight improvement in a few cases, but in general are still quiet, with buying limited.

The demand for copper has picked up. A good business for export has been done and domestic consumers are showing more interest, some purchases having been made for delivery into October. The tin market is again flat. The demand for spelter shows no improvement, and the market is likely to remain dull until increased activity in the iron and steel trades brings orders from galvanizers. Lead is quiet and unchanged.

Silver is reported in better demand, due to inquiries from the far East.

The iron and steel trades, though a slight improvement in certain products at some markets is noted, are in general quiet and unchanged. The demand for pig iron has fallen after showing signs of improvement, and more furnaces in the Pittsburg district are going out of blast. Southern furnaces continue active. Of iron products, cast-iron pipe is in best demand. The sales of steel billets, rumored last week at $19, Pittsburg, are confirmed. In general the outlook is for a quiet summer for all branches of the steel industry, with a possible revival of interest in the fall months.

The bituminous coal trade is active in some consuming territories and quiet in others. In Alabama producers continue to store coal in anticipation of an expected strike of the miners on July 1. In the Pittsburg district the mines supplying the lake trade are busier than at any time this year. The market for Indiana and Illinois coals continues dull. Along the Atlantic seaboard quiet still reigns with no signs of coming activity.

The movement of anthracite up the lakes is assuming large portions, as, owing to the delay in the opening of navigation, consumers and dealers want the coal as soon as they can get it. It is quite likely that the movement will be nearly as heavy as last year. In the East the anthracite trade is seasonably active. The recent cut of 50c. per ton on pea and buckwheat sizes by one company applied only to certain grades and proved even more temporary than was anticipated. The company has restored former prices.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

As much as 1.43 per cent. of potassium cyanide and 2.60 per cent. of thiocyanate have been found in blast furnace flue dust.

The iron ore deposits near Kertch, South Russia, are estimated to contain 850,000,000 tons of ore. The ore lies near the surface and is easily worked, but it is of inferior quality, averaging from 30 to 40 per cent iron, and from one to two per cent phosphorus.

Copper smelting was attempted in this country as early as 1650, but the real inception of the industry dates from 1845, when Lake copper first appeared on the market. In the latter year, also, smelting works were erected at Boston and Baltimore to treat ores imported from Chile and Cuba.

The new main shaft of the Waihi gold mine in New Zealand was sunk 83 ft. in 18 days. The shaft is 32 ft. long by 8 ft. wide, and is timbered with 9 in. square sets, with lagging. The depth referred to was from 20 to 103 ft. from surface, the shallowness being necessarily favorable to speed of sinking.

At the Klienfontein shaft, in the Transvaal, 858 ft. of sinking was done in the first five months of 1903. The dimensions were 21 ft. by 6 ft., the rock was hard, and the maximum rate of progress (in May) was 7 ft. 2.2 in. per hole bored, there being 4,032 holes, or 144 rounds.

About 8,400,000 gal. of water are evaporated daily from the salt ponds in Utah when the pumps are operated 10 hours a day during June and July. In August the salt harvest begins, and the yield is at the rate of 150 tons per inch per acre. Utah produces annually nearly 60,000 tons of salt.

Although steel containing about 5 per cent of manganese is so brittle that it can be pulverized under the hammer, yet an increase in the manganese content to about 13 per cent gives great ductility combined with great hardness —a remarkable combination of qualities—on account of which manganese steel is used for such purposes as rock crushing machinery and mine car wheels.

The extraction of quicksilver from ores containing sulphide of mercury, and occasionally native quicksilver, (the only forms wherein mercurial ores of commercial importance are found) can be classified as the metallurgical process of distillation. It is accomplished by subjecting the ores to a certain degree of heat, applied by one or the other of two methods. In tightly-sealed retorts, wherein the ores are heated without coming in direct contact with the products of combustion of the fuel; or in large furnaces, where the heat and products of combustion of the fuel pass direct into the ore mass and are carried off with the heated mercuric vapors, to be subsequently condensed in large cooling chambers. The essential difference in the two methods lies in the fact that the vapors given off by the ores in the retort furnaces are separated from those resulting from the combustion of the fuel.

THE PREVENTION OF MINERS' PHTHISIS.*

By J. S. HALDANE AND R. ARTHUR THOMAS.

Since miners' phthisis and the associated lung diseases are due to the inhalation of dust particles of hard rock, the problem of preventing these diseases evidently resolves itself into that of the prevention of dust inhalation. Several different methods have been employed to accomplish this, such as the use of respirators to filter the dust from the air, the adoption of means to prevent the formation of dust or to carry the dust away when it is given off, and to arrange the work in such a way that the dust when present may be avoided by the men.

There are many difficulties which prevent the extended use of respirators. They cause a good deal of discomfort to miners, as breathing is more or less impeded, especially if the respirator fits tightly. They also interfere with free communication among the miners. For these reasons the temptation for the men to remove their respirators is always strong. To overcome all these difficulties satisfactorily under actual working conditions appears to be difficult, and the end in view can usually be obtained more easily in other ways. Respirators such as wet sponges ought, however, to be used by miners who have to go for a short time into very dusty air.

A great deal can be practically attained by preventing dust being given off into the air, and this method of dealing with the matter ought to be adopted when possible. The most urgent problem is that presented by the conditions under which rock-drill men work. The dust from rock-drills in boring dry holes cannot be dealt with by increased ventilation; but it is well known that no dust is given off from wet holes. The only way of wetting holes driven in an upward direction by an ordinary percussion drill is to use a jet of water. If a jet is directed upwards into the hole parallel to the bit of the rock drill, the giving off of dust is completely prevented. When, however, the hole is more than a foot or two in depth, the water fails to reach the cutting edge behind which a ring of very tenacious mud is apt to be formed. When the bit is withdrawn at the end of the operation its expanded end catches in this ring of mud and may thus cause delay. For this reason it is better not to wet the hole for more than a few inches from the edge. Hence either a plain jet directed obliquely, or a scattering jet or spray, should be employed.

The simplest method of supplying water for the jets is to carry an iron water pipe along the level with the air pipe and to take the water from the end of this pipe to the jet through a piece of armored rubber hose of narrow bore. In many places, however, water cannot be conveniently obtained or the pressure may be insufficient. To overcome this difficulty we have used at Dolcoath the following apparatus. A steel cylinder holding 12 gal. or more is placed in some convenient position out of the way of blasting. The cylinder has three tubes, of which one provided with a funnel is for filling with water, one for connection with the compressed air pipe and one for connection with the flexible armored pipe for carrying water to the jet or spray. On closing the filling tube and opening the compressed air tube the water is driven to the jet. The pressure is sufficient to enable the jet to be used at points up to about 100 ft. above the cylinder. To obviate the danger of the cylinder's bursting or being injured by rough usage, they are stoutly made and tested to a pressure of 600 lb. per square inch. The water used may be conveyed to a large vessel placed beside the cylinder for convenience in refilling. One filling will last for the shift. A nozzle or spray with an opening of about 0.05 in. diameter is sufficient. The spray nozzle we have employed is of a kind commonly used for garden syringes and is so arranged that a rotary movement is imparted to the water before it issues.

The prevention of dust inhalation by rock-drill men is such an important and urgent matter that the use of percussion drills in mines without water jets or other efficient means of preventing the dust from being given off should be definitely prohibited, and we have no doubt that the great majority of both miners and mine owners would strongly support legislative interference in this direction.

A further problem is presented by the dust produced by blasting in ends and raises where rock-drills are employed. The following plan devised by Mr. William James, of Dolcoath, has been found effective in dealing with dust from blasting. At the mouth of the level a piece of 6-in. iron pipe provided with a side tap is let into the ordinary 2-in. iron pipe that carries the compressed air to the drill. Before blasting this is filled with water through the side tap from a cistern after the compressed air has been shut off. Immediately after the blast the compressed air is suddenly turned on. The water is thus driven along the pipe and a mixture of finely divided water and air is discharged from the open end, which is pointed toward the face that has just been blasted. By this means the dust is entirely cleared from the last 30 or 40 ft. back from the fall. If a ventilating pipe is carried forward about as far as the open end of the compressed air pipe, any dust that penetrates outward beyond the reach of the water can be quickly removed. This plan implies scarcely any trouble and no extra apparatus, except the piece of 6-in. pipe and the water-pipe for filling. The water partially washes out from the air any nitrous fumes which may be present, but, of course, no carbon monoxide; and for this reason a ventilating pipe is desirable in cases where the level or raise has been driven more than a few fathoms from a shaft or winze.

The dust produced in moving the ore and conveying it to the shaft can be prevented entirely if all the material moved is kept damp. By taking a little trouble in this respect and using buckets of water wherever possible, the individual miners can do a good deal to prevent the formation of dust.

Where metalliferous mines are very dry the use in intake airways of sprays similar to those employed in coal mines would greatly assist in keeping the air moist. One of the chief recommendations of the Transvaal Medical Society for the prevention of miners' phthisis is that dry mining, should, as far as possible, be converted into wet mining. While we entirely concur with this recommendation, we ought to point out that wet mining in the Transvaal would under present conditions greatly increase the risks from ankylostomiasis, unless satisfactory sanitary protection could be introduced for preventing the spread of this disease. But for the dryness of these mines this disease would, in all probability, have proved extremely troublesome before now.

*Abstract of a paper read before the Institution of Mining & Metallurgy, May 19, 1904.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in this JOURNAL.

EXPLOSIONS IN AIR COMPRESSORS.

The Editor:

Sir.—The letters and articles appearing in your columns in regard to explosions in compressors and receivers have been very interesting. Such an accident occurred at the plant of the Royal Gold Mining Company in Georgia during the time that I had charge. We were running on single shift, and the foreman claimed that he himself had blown out and drained the receiver early in the morning, but as he was a careless fellow, I have my doubts about this. He did not report that he had found a leak in the flange union of the main from the compressor to the receiver, and had packed it by driving an ordinary wooden shingle into the leak.

The compressor, a Rand C. six drill, and hoisting engine were both in the same room, and were run by the same engineer. At 11:30 A. M. he started to lower a cage containing men, and immediately after starting he noticed that the compressor began to race and the air gauge ran up from 60 lb. pressure to 150 lb.; he started to leave his engine in order to shut off the compressor, but remembering his strict injunctions about hoisting men, stepped back to his engine just in time to avoid being killed by the head of the receiver, which was blown through both sides of the engine room and down into the field, several hundred feet away, wrecking, on its way, all the compressor pipes.

The receiver, which was of the well-known horizontal type, measured 42 inches in diameter by 10 ft. in length. It was placed in the open air near the collar of the shaft, and an unobstructed view of it was obtainable from the blacksmith shop. At this point the smith's notice was first attracted by the hissing of escaping air at the flange union already mentioned, and upon looking in that direction he saw smoke and sparks issuing from the joint, and then saw the receiver hopping along the ground away from the compressor. The receiver moved its full length away from the compressor before the head next to the compressor let go with a tremendous report, as already described. Had the explosion occurred half an hour later there would have been great loss of life; as it was no one was killed. Upon examining the receiver it appeared to be in excellent condition, the staybolts of the head showed no weakness, and it seemed marvelous that it was wrenched free.

My explanation at the time was that the receiver had been carelessly cleaned, that there was an accumulation of oil and dust, which under the heavy pressure had formed an explosive gas and the shingle had given the spark to touch it off. Nothing unusual was noticed at the drills before they stopped, and the foreman claims that the safety valve on the receiver was in good condition. From all these facts I think there can be no doubt that a very powerful explosive gas was formed, and formed very quickly, as the whole thing was over in a few seconds, before the cage had dropped 50 ft., and before any intimation had reached the drills 250 ft. from the receiver.

S. H. BROCKUNIER.

Wheeling, West Va., June 15, 1904.

MINE EQUIPMENT AND ORE RESERVES.

The Editor:

Sir.—The article on ore reserves and mine equipment by Mr. H. C. Hoover covers the particular field discussed by him with such skill that it seems to me there is not much more to say. Unfortunately most of us do not have the opportunity of unraveling the problems pertaining to the exploitation of such magnificent mines as those which Mr. Hoover directs, nor do we operate with the reserve capital of such strong companies as those with which he is connected. The mining future of this country depends to an ever-increasing extent on the profitable exploitation of relatively small, erratic and low-grade deposits; in other words, in making hard propositions pay. The West has been pretty well run over and it is probable that most of the big things are already under process of development, and while, of course, some of us will be working bonanzas for several generations, the vast majority of mining engineers will be continually up against a hard game. It is the problems pertaining to the successful operation of such deposits which more vitally concern the majority. To my mind there is more credit due to those who take up the hard propositions and make them pay than to those who exploit bonanzas along finely scientific lines; the first usually requires energy, sagacity, perseverance and, very often, *daring;* while the other needs chiefly cool calculation. The acquiring and early development of the bonanza is a different matter; in this achievement much the same qualities are called for as in the operation of a hard proposition. But only a few of us, as already stated, will ever have the opportunity to acquire a bonanza for ourselves or clients, so we may just as well look the facts in the face and consider the problems incident to the operation of that large class of deposits with which most of us are more or less directly associated. In such cases the amortization of the equipment becomes even a more serious problem than in the instances discussed by Mr. Hoover, for it becomes doubtful whether the expenditure will ever be amortized at all, rather than a question of how many months will be required to get even. And yet conditions of operation, as they exist, often force an expenditure for equipment before one can figure the ore reserve to justify it. It may be necessary to equip and begin production, or quit altogether. In such cases I think a man is justified in using the most temporary expedients, rather than in providing such an equipment as would be called for if a long campaign were actually assured.

It has been my observation that more mines are killed by too much equipment, and ill-advised equipment, than from errors in the opposite direction. The tendency to make large expenditures to assure a low working cost per ton has been at the bottom of many a mining failure, because the hard facts of the limited number of tons available and the utter worthlessness of abandoned mine equipment were both entirely overlooked. The sure loss of operating with inefficient equipment and the possible loss of expending too much on equipment, present the Scylla and Charybdis of this feature of mine management; the admirable sailing chart compiled by Mr. Hoover will guide the big steamers with scientific accuracy, but the pilot of the little sailing vessel, driven by fickle winds and diverted by unseen currents, cannot follow the directions, and under such conditions success is the more admirable and failure the more pardonable.

It seems to me that the questions incident to providing the ordinary mine with equipment does not permit of any very extended discussion, along general lines, because nearly every mine has its own individual problem and those that don't, fall without question under Mr. Hoover's rule, but there is an infinite variety to the problems confronting the average mine manager and the successful solution of hard problems of management make the basis of what is to many of us the most interesting form of mining literature. The consideration of the difficulties that have beset our fellows and the means they adopted to overcome them is sure to be of practical service sooner or later; and in the hope that I may be able to start the ball a-rolling in this direction I will mention three instances out of my personal experience.

The estate of W. S. Stratton, deceased, included some 713 acres of territory in the Cripple Creek district of Colorado. There is little of this territory from which there has been no shipment of ore and some parts of it have made a large production. The pay ore is found in isolated bodies scattered through a perfect network of veins, contacts, and mineralized dikes. The grade of the ore at Cripple Creek is comparatively high, so that a relatively small ore-body may be of considerable economic importance. As a consequence of these conditions the problem of finding the ore very much overshadows any other problem in the exploitation of these deposits. The successful 'ore-finder' is the man who makes an exhaustive study of a given locality and then watches every little indication as work progresses. The failure to follow off into the wall the smallest stringer that assays may means the loss of a good ore-body. The most successful 'ore-finders' in the camp are the small 'leasers,' whose self-interest calls forth a degree of astuteness and careful attention to detail which is not obtainable in a paid force. Therefore, I recommended that the territory which was not developed by deep shafts should be leased in surface blocks and that a large part of the territory that was developed by deep shafts should be let on the tribute system. This plan has been slowly put into effect, and, thus far, the results are highly satisfactory.

At the Golden Cloud mine in Montana the vein is small, remarkably continuous and of exceptionally uniform value. The average grade is $25 per ton in gold and the property is equipped with a good mill. The quartz is soft and frozen to the walls, and the problem to be solved was how to mine this ore cleanly at a cost sufficiently low to leave a margin of profit. When working on day's pay the miners found the quartz very nice drilling ground and shot it all to pieces, so I put them on a contract system whereby each pair of men had a certain block of ground and were paid so much per ton of clean quartz delivered at the mouth of the tunnel. The system has proved satisfactory thus far.

At the Cornucopia mine in eastern Oregon in 1896 the principal problem to be solved was the successful milling of a rebellious ore. Mr. T. A. Rickard, as consulting engineer, was in control of operations. My position was a subordinate one. The ore carried part of its values as free gold, part as silver, gold, cop-

per and lead in pyrite and part as telluride of gold. When Mr. Rickard took charge there was a 20-stamp mill on the ground equipped with six vanners, the product of which was chlorinated, with a heavy loss, mainly in the roasting stage of the process. This loss had been undetected by reason of stupidity in calculations, which failed to allow for the decrease in weight by elimination of moisture in roasting. The shipment of the concentrate to the smelter at Tacoma gave larger profits, but even then the extraction was poor, by reason of the values escaping in that part of the tailings which would pass a 100-mesh screen. Mr. Rickard and Mr. Barnhart, the superintendent, then decided to introduce hydraulic separators, two more vanners and a canvas slime plant, so that the extraction was increased from 65 per cent to 85 per cent, and the mine became a profitable enterprise. The essence of this success was not only in the improved extraction which was attained at every step of the milling process, but in a general reduction of working costs carried out by the superintendent.

GEO. J. BANCROFT.

Seattle, Wash., June 10, 1904.

PYRITE SMELTING.

The Editor:

Sir.—My experience with copper ores does not agree with that gained in smelting copper-nickel ores and I find it necessary to get out a revised creed and smash a few of my former dogmas.

The difference is radical and seems to depend principally on the behavior of copper matte as compared to copper nickel matte. The fusing point of copper matte is much lower than that of copper nickel matte, which is another way of stating that the freezing point of copper nickel matte is higher than copper matte in proportion to the nickel contents. The result is that as the nickel increases more fuel is needed on the charge and this fuel prevents the oxidation of sulphides and makes raw smelting of nickel-copper pyrrhotite impossible. Another feature is that the copper matte can absorb a greater number of heat units in the smelting and give them up to the slag without freezing than can nickel matte. This results in preventing accretions at the tuyeres and the elevation of the smelting zone, which takes place rapidly in the case of copper-nickel ores.

The behavior of the settler on a furnace smelting copper-nickel ores is equally affected by this lack of heat carrying capacity, and the tendency of the walls to thicken under conditions that with copper matte would cause a runaway, are quite remarkable when observed.

It has been my experience in Ontario that a charge of copper-nickel ores could not be smelted with less than 10 per cent of coke, and here we can run on 5 per cent, smelt 75 per cent of coarse crude ore and make 35 per cent matte at one operation.

Previous to my experience here I had maintained that the fairy tales which were published about raw smelting were without foundation, but I see now that I have been to a great extent the victim of my experience. I believe that, given the proper conditions, with a furnace large enough and blowing engines to give a positive delivery of blast regardless of pressure and of sufficient quantity, that a furnace may be driven at the rate of 500 to 1,000 tons per day of such ores as Mount Lyell, Tennessee Copper Company, or Rio Tinto with less than 1 per cent of coke and effect a concentration of 5 or more tons of ore into one ton of matte. Further, that this matte may be concentrated, by re-smelting under similar conditions, to a converting grade.

Few men have the opportunity to experiment with conditions of this magnitude, but I believe that it will be demonstrated that it is possible and more profitable to handle ores of this character in a two-stage raw smelting plant, with cold blast, than by roasting or with hot blast.

It is only a year since I made a journey of 2,000 miles to see a furnace that was said to be running on a charge of raw ore with less than 3 per cent coke. When I got there it was smelting roasted ore with 10 per cent coke, and I returned condemning the whole story as a myth. I have since found that *given the proper conditions* it is quite possible and I hasten to get on the band wagon and say "me, too."

HIRAM W. HIXON.

Tezuitlan, State of Puebla,
Mexico, May 27, 1904.

DIAMOND CONCENTRATION.

The Editor:

Sir.—Permit me to correct an error which appears under the heading 'Metallics,' in your issue of yesterday, in reference to the operation of the 'greaser' used in the South African diamond mines. You state that the "diamonds adhere, while the garnets, zircon, mica, magnetite, pyrite, and other minerals are washed off."

While the general tenor of your article is correct and it is claimed that the diamond is the only mineral which when wet really adheres to the grease, yet on account of their value and the mechanical loss which would be sustained, it is impossible to employ a flow of water sufficiently strong to remove the heavy minerals, such as you mention and others, and by reason of their specific gravity such minerals, largely remain embedded in the grease, while the quartz and light earthy minerals are washed away as you state. Periodically the grease, with the adhering diamonds and the embedded heavy minerals, is scraped off of the table, placed in a suitable receptacle, and the grease removed by melting and dripping through a screen bottom. Formerly the diamonds had to be sorted from this mixture, but in 1900, when the writer was connected with the Wetherill Separating Company, he made a number of tests in the presence of Mr. Gardner F. Williams, general manager of the De Beers company, of material taken from the greased tables, with the view of separating it magnetically, and in June of 1901, the separator company shipped one of its Rowand cross-belt separators to Kimberley, for the purpose of treating such material.

In the samples tested for Mr. Williams, who claimed they were fair averages of the products from the greasers working at the different mines, we removed, according to the writer's recollection, from 92 to 98 per cent as a magnetic product, leaving the diamonds concentrated in the 2 to 8 per cent of the non-magnetic residue, which consisted mainly of iron pyrite, with a few grains of quartz which had remained on the greasers. The magnetic product consisted largely of magnetite, ilmenite, chromite, garnets, bronzite, etc.

It may be added that, to be certain none of the diamonds would be removed in the magnetic product, a lot (which Mr. Williams said represented practically every variety found in the mines), was treated by itself and passed very slowly through the magnetic fields with the full power of the apparatus applied, and none of them was attracted, but all passed into the non-magnetic residue.

The use of the Rowand Separator by the De Beers Consolidated Mines, Ltd., at Kimberley, is mentioned in the *Mineral Industry*.

JOHN N. JUDSON.

New York, June 17, 1904.

"YOU CAN DRIVE A HORSE TO WATER," ETC.

The Editor:

Sir.—In your issue of June 9, I notice a letter which refers to the careless use of terms in mining reports. It is unfortunate that so many words, used in connection with mining, should be so varied in meaning as to leave doubt in the mind of the reader as to the exact conditions being described in a report on any particular mining property.

The trouble is not confined to the mining industry alone, but may be met with in many branches of trade and manufacture. It may be compared with the confusion which formerly existed (and still continues to a certain extent) on account of the many systems of weights, measures and gauges used in English-speaking countries.

The adoption of standard gauges has improved matters greatly, and so the publication of a standard glossary of mining terms might perhaps help to systematize our reports. It is one thing, however, to publish a glossary *as* a standard and quite another to secure its general adoption as such.

"You can drive a horse to water, but you can't make him drink"—unless he wants to. Some of the terms often used are enough to drive a mining engineer to drink but not to take water. There are doubtless many engineers of experience who are set in their ways; and although they may be really more competent to estimate the value of a mine and plan its economic development, than the recent graduates of technical schools; still they have their own private vocabulary and may find it hard to make a change.

Your correspondent has given a few examples of terms carelessly used, and I hope his letter will be of service in punching some of our professional brethren in the ribs.

Not only are many terms indiscriminately used, but often the spelling is a little out of the usual run. In a report which recently came to my hands an engineer persistently referred to a *load* which had been discovered on a certain property. He, of course, meant a mineral-bearing deposit, but as the property is merely a prospect the term could be readily construed as a *burden* to be placed on the shoulders of the prospective investor.

In placer mining I have often heard the terms *sluice* and *flume* used synonymously. The former I consider to be properly applied only where gravel or other material is conveyed by means of a current of water, usually with the idea of recovering the heavy particles such as gold, platinum or stream tin; the latter term indicating simply and solely an adjunct of water supply.

Pay streak is a favorite all-around term used as seductive bait for the investor. There are

some promoters who would assert that there was a particularly rich pay streak of extra fine green cheese somewhere on the moon; provided that they could only convince the investor that a trip to the moon was feasible.

In one of my reports I was obliged to use this term in referring to the richer portion of a certain placer property, in order to distinguish it from the greater area of nearly barren gravel deposit. In doing so, frankness compelled me to call it the *so-called pay streak,* for there was not sufficient gold to pay the actual mining expenses, not to mention the exorbitant salary of the promoter as general manager.

Pay streak is one of the important terms to be regulated, being entitled to a seat way up on the mourners' bench with *ore-in-sight, non-assessable,* etc.

A crying need at the present time is some national legislation regulating the use of technical mining terms in the prospectuses of wildcat and musk-rat mining corporations. The Post Office Department is making some excellent strides toward that goal.

Let the good work go on!

WM. B. MCKINLAY.

Delta, Idaho, June 15, 1904.

THE PREPARATION OF BROWN HEMATITE IRON ORES.

The Editor:

Sir.—I have read with interest the article of Mr. F. Lynwood Garrison in your issue of June 16.

The field of engineering, as presumably other fields, is filled with pitfalls for the dilettanti, and I think that Mr. Garrison's article would have been somewhat different if he had had a longer acquaintance with his subject. Of much that he says I have no criticism to make, but his final sentence that ore banks yielding 1:2 and 1:3 of ore to ore dirt are "myths," and that the very best deposits will run from 1:5 to 1:12 caught my attention particularly from the fact that we have been working here for more than 30 years an ore bank which has averaged somewhat better than 5:8 of clean ore to ore-dirt; in other words, the waste is only ⅜ of the clean ore. Mr. Garrison also states "most of the iron ore washers in the Southern States waste the fine are entirely, saving nothing under ¼ to 1/6 of an inch." I have seen a number of ore washers in the South, and I do not recollect seeing one in which the waste was as much as this. The practice at the washer here, which has been published once or twice, is to screen fine ore from the revolving screen through a 14-mesh screen. What goes over the 14-mesh screen goes as ore direct, and what goes through it is removed from the water and treated by a spitzlutte or hydraulic jig designed for the special conditions by no less an authority than Prof. R. H. Richards himself. With equally close sizing there is no reason to doubt that these jigs would give very nearly if not quite as good results as the jigs mentioned by Mr. Garrison. It may be a matter of interest to note that the fine ore and silt not treated by the spitzlutte is so fine that practically all of it went through a 40-mesh sieve, and that only 7 per cent remained on a 100-mesh sieve, as shown by recent tests made by the writer. This is considerably finer than ¼-in. It also disposes of the statement that "this loss in the mud discharging probably can never be greatly checked or avoided." In regard to the types of washer-shafts mentioned by Mr. Garrison, he quite omits mention of the cast-iron pipes, which may be cast in almost any length desired, which in cheapness and ease of attachment of the washer blades are probably the equal if not the superior of either of the forms mentioned by Mr. Garrison, and which are infinitely superior in tortional rigidity to the McLannahan-Stone angle-iron shaft, in which I am informed the springing becomes an objectionable feature in the long lengths.

I trust that you will find space for these amendments to some of Mr. Garrison's statements.

J. E. JOHNSON, JR.

Longdale, Va., June 18, 1904.

ASSAY OF CYANIDE SOLUTION.

The Editor:

Sir.—Replying to A. R. T.'s inquiry in your issue of June 16, on a quick method for assaying cyanide solutions: I have used a method which has generally given good satisfaction, and is especially valuable in the saving of time with solutions containing less than $0.20 a ton in gold.

Take a sample of 1,000 c.c. (34.3 assay tons) of solution. Put in a 2-liter flask. Add 1 to 2 grams of powdered copper sulphate. Agitate. Add 10 to 15 c.c. concentrated hydrochloric acid and agitate thoroughly. Filter, dry the precipitate on the filter, burn and assay the precipitate according to the usual methods, either in a crucible or scorifier, preferably the former.

I have used this method at many plants in Mexico and this country, and in each case have properly checked its results by the evaporation method.

GRANT D. MILLER.

New York, June 20, 1904.

AMERICAN INSTITUTE OF MINING ENGINEERS.

The eighty-seventh meeting of the Institute will be held in the Lake Superior iron and copper region, beginning at Duluth, Minn., on Wednesday, September 14. Arrangements have been provisionally made, for such as can take advantage of them, covering the journey from Buffalo to Duluth, transportation in the iron and copper regions, and return by rail to Chicago. The proposed itinerary covers visits to the Mesabi range and the Houghton district.

The excursion as outlined closes with the arrival of the party at Chicago on Friday, September 23. Those who desire to visit the St. Louis Exposition can go to St. Louis at once, or remain in Chicago one or two days, as they may prefer. A session will probably be held at St. Louis on Monday, September 26, for the presentation of papers, etc., aiding in the study of the mining and metallurgical features of the exposition. The International Engineering Congress, arranged by the American Society of Civil Engineers, holds its sessions at St. Louis October 3 to 8, and the foregoing programme has been arranged to accommodate members of the Institute who desire to take part in it.

Ninety per cent of the petroleum consumed in Germany is imported from America. In 1903 these imports included 130,993,665 gal. of refined oil.

THE ADVANCE OF ELECTRO-CHEMISTRY.*

BY J. W. RICHARDS.

If electro-chemistry concerned itself only with the study of phenomena and their classification, the deduction of laws and the building of theories thereupon, it would satisfy one of the fundamental needs of the human mind, that of *knowing,* but would leave unsatisfied another and equally vital desire, that of *using.*

The various items in which, in industrial chemistry and metallurgy, electro-chemical methods have either superseded ordinary non-electric methods, or else have created new industries, form a catalogue sufficiently long to arrest the attention of the most superficial observer, and altogether too long to be mentioned in detail within the limits of this address. Suffice it to mention in passing the millions of dollars' worth of copper electrolytically refined, not annually, but monthly; the 100,000 horse-power consumed in producing calcium carbide; the reduction of the cost of aluminium from $5 a pound to 30 cents; of sodium in almost an identical ratio; the revolution being wrought in one of the largest chemical industries by the production of electrolytic alkali and bleach; the capturing of the potassium chlorate industry and the manufacture of phosphorus.

The whole story, if related at length, would be the old story of *homo sapiens* having discovered a new tool, a new instrument wherewith to torture mother nature; a new means of reaching old or of creating new results, and he is necessarily immersed in enthusiasm for this "genius of the lamp," which has performed so many wonders and promises so many more. For the use of electricity puts at our disposal temperatures never before industrially attained; gives us a decomposing agent at whose bidding the most powerful chemical compounds resolve into their constituents; enables us to attack and solve chemical problems in a manner before unthought of; opens up a world of possibilities whose scope we even yet but dimly comprehend. This is the fascination of the subject, the attractive force, the absorbing interest which is reflected in the enthusiasm of the electro-chemist for his profession.

Basing our remarks upon present developments, it may be perceived, to start with, that the electrical methods in chemistry and metallurgy which are most successful are either, *first,* those applied to the more powerful chemical compounds, whose decomposition by non-electric methods is highly difficult and expensive, or else impossible; or, *second,* those applied to new fields of very high temperature reactions impossible of attainment by other means; or, *third,* those applied to ordinary chemical processes, in which the directness of the electrical influence, be it decomposing, reducing or perducing, can not be duplicated or competed with by known non-electric methods.

Primitive man took his first lesson in metallurgy by learning to make iron; to this the ancients added lead, copper, silver, gold and even the volatile mercury. Many centuries later zinc was distilled, and only in the most recent times have sodium, aluminium and magnesium been possibilities. Painfully and slowly alchemy and modern chemistry toiled up the heights of the electro-chemical series, from the easy conquest of the *noble* metals

*Abstracted from *Science,* June 17, 1904. An address by Professor Joseph W. Richards, of Lehigh University.

to the powerful mastery of the *strong* metals, and the steepest part of the ascent has been lightened by the aid of electricity, which has in many cases furnished the easy path to the conquest of the most difficult chemical problems.

It is related of our renowned geologist, Clarence King, that he was an enthusiastic mountain climber, and having from a distance spied a steep mountain, he conceived the ambition of conquering it. Taking a respite from surveying, he equipped himself for difficult climbing, and after several hours of desperate effort finally stood on the summit of the seemingly impregnable butte, only to find an easy trail leading up on the other side.

The most abundant materials in nature are the fixed, difficultly transposable compounds of the strong metals, and their conquest and utilization are the peculiar and special province of electro-chemistry.

According to the estimate of the indefatigable chemist of the Geological Survey, F. W. Clarke, silicon oxide forms 58.3 per cent of the contents of the solid crust of the earth aluminum oxide 14.7 per cent, iron oxide 7.8 per cent, calcium oxide 5.3 per cent and magnesium oxide 4.5 per cent; or, expressed in another way, silicon 27.2 per cent, aluminum 7.8 per cent, iron 5.5 per cent, calcium 3.8 per cent, and magnesium 2.7 per cent.

With these figures in mind, may I not ask whether we fully realize the significance of one of the latest electro-metallurgical triumphs, the production of metallic silicon on a large scale in the electric furnace at Niagara Falls by Mr. F. J. Tone? While the catalogues of dealers in rare chemicals are still listing silicon at dollars an ounce, an electro-chemist has two barrelfuls of it which he is wondering if any one will buy at a fraction of a dollar a pound! Could anything better illustrate the revolutionary character of the electro-chemistry?

To say a word or two more about silicon. I had a somewhat uncanny feeling when Mr. Tone introduced me to his half a ton of silicon. "Here is," I soliloquized, "the first chance which mankind has had to utilize the most abundant solid element on earth. What will be made of it? Can it become as useful as iron? Probably not. Can applications be found for it which will bring it among the ordinary metals of every-day life? Possibly. In any event, here is the material, ready to hand, and no one but the electro-chemist could have made it."

Something of the same feeling must have arisen in the mind of the chemists who first made aluminum a commercial possibility, but his expectations, based on his chemical process, were only actually realized when the electro-chemist gave his solution of the problem. This very element illustrates one of the chief characteristics of electro-chemical processes, viz., their potentiality for improvement. Chemically produced aluminum was out of the race when the metal sold for one dollar per pound, yet the present market price is only one third of that. After the chemical process has done its utmost, has said its last word, the electro-chemical process, which supersedes it, has only *begun* its march of improvement.

Eruptive rocks, particularly the granites, syenites and diabases, are extensively used for road metal. In former times basalt was employed in this way, but its use has decreased owing to its becoming slippery with wear.

THE QUEST OF THE GOLDEN FLEECE.*

By H. H. LEE.

Some time during the Stone Age, when men made their implements from stones, by striking one against the other, a half savage member of the human tribe happened upon a fragment of rock that would not break when struck, but yielded to the blow. Finding the stone malleable and that he could fashion it to his purpose in the making of weapons of war and utensils for domestic use, he returned to the place where he had found it, and sought for other stones of like character; he found them, and then, looking higher, he discovered the ledge whence they came, and learning to break it from its matrix, he thus became the first mining engineer.

Again, while wandering down the banks of some mountain stream, he saw a glistening pebble which caught and held his savage eye. Plunging into the stream, he seized it, and as his hand closed over it, he first felt that mysterious love of gold, older than the written history of the world, which has played so great a part in the development of humanity. He took the glistening pebble back to the people of his tribe, and they envied him the possession of it, so that some of them offered bountifully of their world's goods in exchange for it, while others, more daring, set out to search for more pebbles of the same kind. What weary and dangerous journeys they went upon we do not know, but we do know that the search has never ceased, no matter where it leads, nor what privations it incurs. Since then in all ages, the hurrying feet of men have covered every part of the earth in search of golden treasure.

Among the earliest legends, we read of Jason organizing the Argonauts, and setting sail for the far distant Black Sea in search of the ram of Colchis and his Golden Fleece, and falling under the spell of Medea's charms sowing the field of Mars with dragons' teeth, from which armed men sprang up like mushrooms in the night. Since then, many a field of Mars in the quest for the Golden Fleece has been sown with dragons' teeth. Nations have been subjugated and rulers dragged from their thrones, while the waste places of the earth have in turn been populated and great states have been established by the seekers of the Fleece.

The Roman legions in the conquest of Gaul, turned aside to capture the mines of Spain. And later, the Romans emulating the example of the Argonauts, set sail for Ultima Thule; they reached the shores of Britain and conquered the inhabitants, winning the proceeds of the tin mines of Cornwall, and made the site of the city of London a fortified camp, remnants of which exist to this day.

Cortez landing on the coast of Mexico with an insignificant army subjugated millions of people, and taking from them their golden treasure, poured it into the coffers of Spain, so that Europe felt the stimulus in commerce, in the arts, and in humanity itself. Pizarro, the strong and rapacious, fired with the example of Cortez, drew his Rubicon in the earth with the point of his sword at the frontier of Peru, and crossing it, started with his little band of *conquistadores* to despoil the treasury of a nation.

Within two generations the discovery of gold on the Pacific slope and under the shadow of Pike's Peak caused thousands of Argonauts to sail around the Horn, and a great army of pioneers to travel laboriously across the desert. Arriving at their destination in a country having no government and no laws, they organized miners' courts and established and enacted mining and other laws. In a spirit of Anglo-Saxon fairness to all those who had made the perilous journey, it was decreed that each should have a chance within limitations, but that the discoverer should have a double chance. There were no officially authorized surface lines bounding and defining this surface as in more settled countries, so each miner according to his priority of claim was given a right to a certain portion of the vein or the placer, and this fundamental principle established in California by the miners, has remained in all of our subsequent legislation, though there have been many critics to point out the confusion and uncertainty which results when it is applied to other conditions than those under which it arose.

The Jason of to-day is the American mining engineer. No spot upon the globe is too remote or too difficult of access for him to reach. He is rapidly Americanizing Mexico, conquering it not as Cortez did, but with those more peaceful arts which not only enrich the people of that country, but are awakening them from the sleep of serfdom and ignorance in which they have so long dwelt. He has invaded Peru, but only to extract from the heart of her towering mountains that which was hidden from the rapacity of Pizarro. He has sailed to Japan, to Korea, to Brazil, and to Australia to search for, to examine, and to work the mineral resources of each country. He carried the war into Africa, and after developing the greatest gold district known to the world, rebelled against an ignorant and rapacious government, and, under a new and independent flag, brought on a war that involved nations, and called more than 300,000 men into the field of battle. Nay, he has even invaded the realm of the Great White Czar himself, and now quietly explores the mines in territories where a few years ago no foreigner was permitted to intrude. Far away in the great Northwest under the twilight of an Arctic sky, over 2,600 miles of snow and ice, he has followed his dogs and sledge with the same old tireless energy and indomitable courage which have ever been the marks of those who seek the Golden Fleece.

*Being a portion of an address delivered by Mr. Harry Hugh Lee at the State School of Mines, Golden, Colorado, on June 3, 1904.

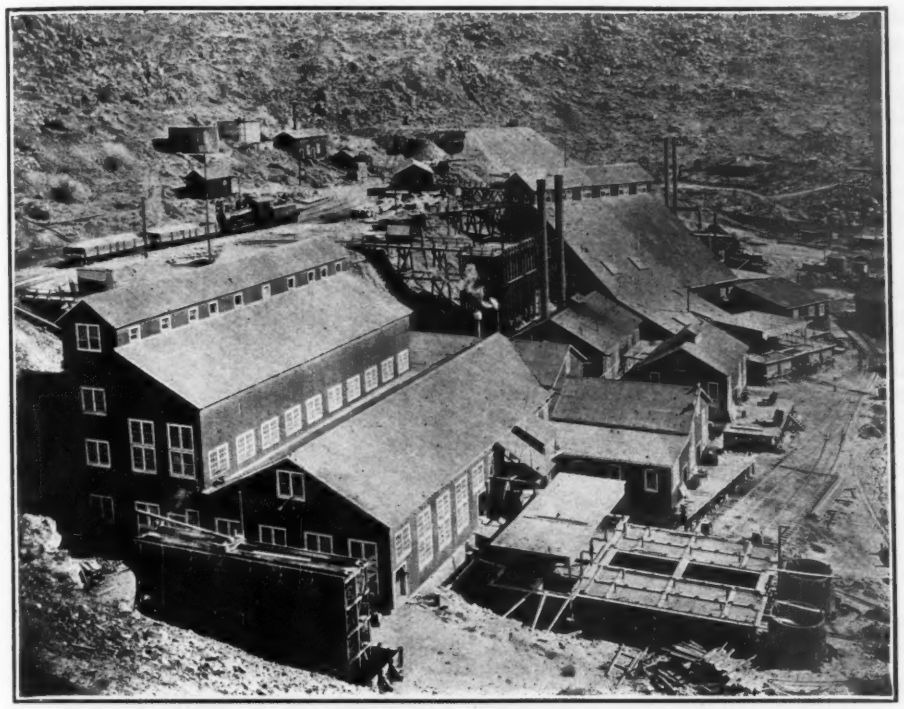
It is not yet half a century since Col. Drake discovered petroleum on the waters of Oil Creek, near Titusville, Pa. The total production of crude petroleum from 1859 to 1902—43 years—has been no less than 1,165,280 727 bbl. Of this output, Pennsylvania and New York contributed 53.9 per cent; Ohio, 24.3 per cent; West Virginia, 11.3 per cent; Indiana, 3.9 per cent; California, 3.6 per cent; Texas, 2.1 per cent, leaving 9 per cent to be supplied by Kansas, Colorado, Louisiana, Illinois, Missouri, Indian Territory, Wyoming, Michigan and Oklahoma.

Portland cement work should be allowed a year to harden and dry before applying oil paints. A solution of common water-glass in three or four parts of water should be applied first. Two coats of this, followed by washing with water, and then applying another coat of water-glass, have been found effective.

THE CONGRESS MINES, ARIZONA.

EDITORIAL CORRESPONDENCE.

Congress is one of the few camps in Arizona engaged exclusively in gold mining, and it is one of the largest producers of the precious metal in the Southwest. Aside from the Commonwealth at Pearce, which has an 80-stamp-



CONCENTRATING MILLS OF THE CONGRESS CONSOLIDATED MINES COMPANY.

mill, no other mine is being operated on so extensive a scale. A large proportion of the gold output of the territory, amounting to nearly $5,000,000 annually, is made by the numerous small mines, while the remainder is mostly produced as a by-product in the copper industry.

The Congress mines were first opened in 1887. In 1893 they were taken over by the Congress Consolidated Mines Company and have since been worked steadily with financial success. Mr. W. F. Staunton, of Tombstone, is the general manager of the property, with Mr. Meade Goodloe as assistant manager at the mines.

The geology of the Congress ore bodies is simple. The country is a coarse biotite granite which constitutes a portion of the pre-Cambrian complex of western Arizona. It outcrops in great force, and forms the mass of the mountain group that rises just west of the mines. It usually shows a pronounced gneissoid structure, though its igneous character cannot be doubted. The lodes, or 'ledges' as they are locally called, comprise several quartz veins associated more or less closely with intrusions of dike rocks. The Congress and Niagara lodes, which have been chiefly exploited, outcrop in close proximity and have a parallel strike running a little west of north, while the dip varies from 22 deg. N. E. in the Congress to 45 deg. N. E. in the Niagara. On the footwall of the Congress is the 'rich quartz' lode conforming with it in strike and dip. This has not been exploited as yet. A fourth vein, the Queen, now undergoing development, lies northeast of the Congress and strikes nearly at right angles to the others.

There is a striking variation in the composition of the dike rocks which suggests that they represent several distinct intrusions. The Congress lode follows a strong dike, making usually along its footwall, but sometimes on the hanging. The dike is not mineralized except where penetrated by stringers or offshoots from the vein. In the Queen lode, however, there is a strongly altered basic dike which is so heavily impregnated with sulphides as to form a valuable ore-body. Another, and later, intrusion is represented by a strong porphyry dike which outcrops along a line nearly parallel to the Congress and Niagara lodes, but dips at a higher angle and cuts both in depth.

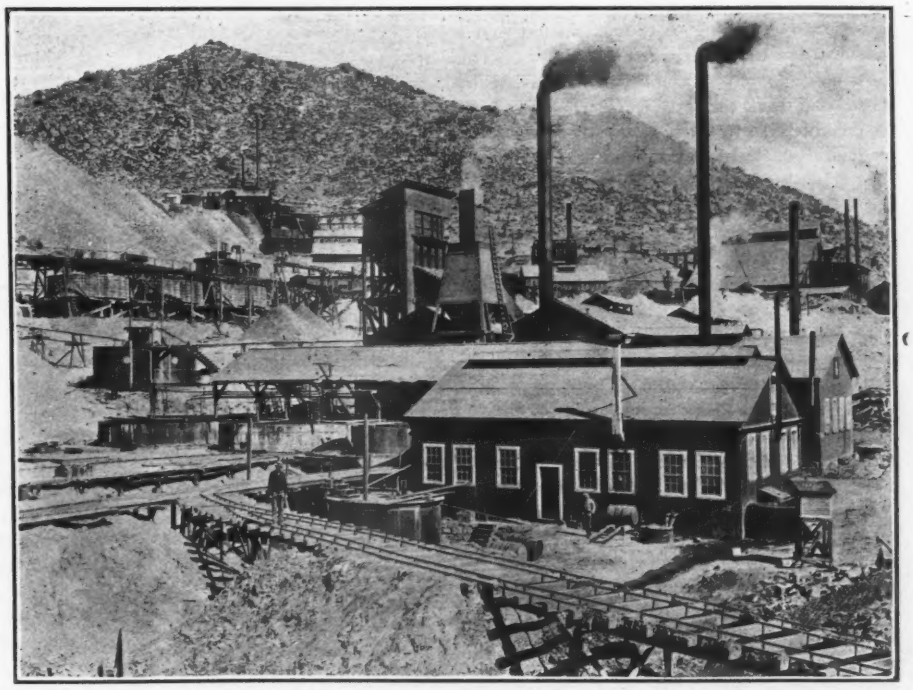
All of the veins are composed of massive white quartz and carry their values in sulphides. Both pyrite and marcasite occur, the former being the principal ore in the Niagara, while the Congress vein yields mostly pyrite. The value of the concentrates runs as high as $300 per ton.

The work underground is carried on through inclines sunk on the dip of the lodes. The low angle of dip in this case justifies the adoption of inclines rather than vertical shafts from the standpoint of economy. There are seven inclines, of which six are at present in commission. The deepest workings are on the Congress vein; No. 3 incline is now down 3,800 ft., making it the deepest working in the whole Southwest. In this vein there is a noticeable tendency for the ore to occur in lens-shaped bodies or shoots the longer axes of which have a distinct pitch. Drifts are run at intervals of 75 ft. from No. 3 incline on the Congress and at 100 ft. from the other inclines.

Skips run in balance are used for hoisting, and the ore is trammed to the mills. A tunnel 1,200 ft. long has been constructed to facilitate handling the ore from the main Congress and Niagara shafts, which are situated northwest of the works over a heavy rise of ground.

The method of ore treatment consists in stamp milling and concentration, supplemented by cyanidation of the tailings. No attempt is made to recover any of the values by amalgamation. The concentrates are shipped to El Paso for smelting.

The milling plant is of thoroughly modern construction. It consists of two mills of 40 stamps each. No. 1 mill is supplied with 850-lb. stamps dropping 6 in. 90 times per minute, while No. 2 mill has 1,050-lb. stamps with a 6-in. drop and a speed of 100 times per minute. The screens are 20-mesh. The combined capacity of the two mills is about 300 tons per day. From the stamps the ore passes over New Standard concentrating tables which give a product running as high as $300 per ton.



CYANIDE PLANT OF THE CONGRESS CONSOLIDATED MINES COMPANY.

The cyanide plant consists of three 200-ton vats for leaching the raw sand, and seven vats of 100 tons each for the slime. As a rule, the latter carries about twice the values of the former, the finely divided clayey matter having a tendency to pick up the sulphides. It has been found advantageous to roast the slime, as the extraction is increased thereby nearly 25 per cent. About one part of slime is mixed with one and a half parts of sand and roasted in a Brown horseshoe furnace. The average extraction is thus brought up to over 90 per cent of the gold present in the slime.

LUMINESCENT ZINC-BLENDE.

BY A. S. EAKLE AND W. J. SHARWOOD.

Tribo-luminescence, or phosphorescence induced by friction or scratching, is a phenomenon exhibited by some minerals, although in most cases the light obtained by such mechanical means is too faint to be seen except in complete darkness. Some varieties of zinc-blende, in which the frictional luminescence is a very prominent characteristic, have long been noted at Kapnik, Hungary, and a few other European localities, often associated with the more common non-luminous kinds.

Many textbooks of mineralogy contain the statement that "certain varieties of zinc-blende phosphoresce by rubbing, scratching, or breaking," and some of the early works on minerals allude to this fact, but, so far as the writers could ascertain by a diligent search, practically nothing has been published in the regular scientific journals concerning this rare variety of blende. While zinc-blende is a common mineral, the luminescent variety is extremely rare, consequently but little is known about it, and specimens exhibiting such a light phenomenon are natural curiosities.

Recently an extensive vein of ore, said to be eight feet wide, has been discovered in Mariposa county, California, specimens of which, when scratched with a knife blade, show a bright line of light following the point of the blade. The appearance is that of a series of momentary sparks and the luminosity is plainly perceptible in daylight. In fact, the luminescent property is so strong that the slightest scratching, even with the fingernail, will produce light, and naturally this unusual phenomenon has given rise to various speculations concerning its cause, many jumping to the conclusion that it must be due to the presence of radium. This view was adopted by a mining company, which advertised that the ore was rich in radium, basing this claim on the report of a self-styled chemist who made an astonishing discovery that it was an "uranio-sulphate ore" containing a large percentage of radium—"only a few ounces of the ore being required to produce a gram of radium." The company, however, has since deemed it wise to abandon the radium hypothesis.

In the samples examined by the writers the ore has either a platy or a schistose structure, and in color ranges from a light to a dark gray. The schistosity is so pronounced that specimens might easily be taken for ordinary dark gray schists, except for their greater weight. As will be seen, however, from the chemical analysis, the only constituents that might belong to an ordinary schist are the alumina and silica, which form quite a small percentage. The ore is mainly a granular mixture of white barite (barium sulphate) and brown sphalerite (zinc-blende), but with these occurs a much smaller amount of dark gray metallic grains which are mostly tetrahedrite, though one specimen showed a large percentage of galena.

The zinc-blende was easily proved to be the luminescent constituent of the ore. The gray sulphides were more readily soluble in acid than the blende, and were therefore easily removed, leaving much of the zinc-blende mixed with the insoluble residue. This residue, after drying, was rubbed in a mortar in a dark room, and shown to be quite luminous. The treatment with acids was then continued, and the residue, tested at different stages, was shown to possess luminescence as long as any undissolved blende remained, although with decreasing intensity. When all the blende was removed, and the insoluble residue of barite washed and dried, not a trace of light could be detected. The proof was thus certain that luminescent zinc-blende was the cause of the light phenomenon.

The intensity of the light developed by rubbing, varies considerably in different specimens. Many exhibit it even when saturated with water, or beneath the surface of water. It appears to depend upon the crushing of crystalline particles, for it can be seen even after the blende has been reduced to an almost impalpable powder, by laying this powder on a sheet of paper and rubbing with a knife blade. When small fragments are heated in a closed vessel some sulphur is evolved; if the heating is continued at about 1,000° C. as long as sulphur comes off, the surface of the fragments, after cooling, is found to have lost this property. If, however, they are broken, the fresh surfaces exposed exhibit it as before. On the other hand, when a fragment is gently roasted, as in the oxidizing flame of a blowpipe, until it ceases to yield sulphur dioxide, the thoroughly roasted residue shows no trace of luminescence, even when rubbed in a dark room.

Analyses of different samples of the material may vary quite widely, since the composition is not definite, and galena, stibnite, chalcopyrite and other sulphides are very apt to occur as associates. A complete analysis was made by one of the writers, of a typical specimen of the schistose ore, which will serve to show the approximate proportion of the several constituent minerals. This sample had been kept in a warm, dry room.

Insoluble in Acids: Per cent. 58.95 (after removal of lead sulphate)

Found in insoluble portion:

Water (at red heat)	0.36
Barium sulphate	46.07
Alumina	5.20
Silica	5.30
Zinc and iron	Traces.
	56.93

Found in soluble portion:			*Calculated as sulphides:*		
Zinc	20.75	—	Zns	31.60 per cent.	
Iron	2.60	—	FeS	4.08	"
Lead	2.62	—	PbS	3.02	"
Copper	1.60	=	Cu_2S	2.00	"
Antimony	0.20	=	Sb_2S_3	0.28	"
Arsenic	0.33	=	As_2S_3	0.54	"
	28.10			41.52	"
Sulphur	13.37				
	41.47				

There was no loss of weight at 100° C., but after a time the weight slightly increased, a smell of sulphur was also noted. On stronger heating in a closed tube some free sulphur was evolved.

Gold and silver were found in the two samples examined, and traces of cadmium and manganese, but no calcium or magnesium.

A trace of tellurium was found in one sample.

No pyrite could be detected, and the iron probably exists in the blende as FeS, this formula agreeing almost exactly with the amount of sulphur actually found. The lead appears to be all in the form of galena, and some specimens show a considerable percentage of this mineral. It is probable that the arsenic and antimony are combined with the copper to form tetrahedrite, for if all the arsenic and antimony are calculated as $4Cu_2S.(SbAs)_2S_3$, the percentage of copper required will be 1.543 per cent, or of Cu_2S, 1.93 per cent, as against 1.60 per cent and 2.00 per cent actually obtained in the analysis.

The precipitate weighed as alumina may possibly contain small proportions of other earths. Alkalis were not determined and may account for a large portion of the deficit of nearly 2 per cent, possibly being combined as a silicate with the alumina and water of the insoluble portion.

The specific gravity of the total mass is 4.1, and that of each of the recognized constituents is very nearly 4, so that mechanical concentration is a somewhat difficult problem. An attempt to separate any lighter constituent by means of the Thoulet solution (mercuric potassium iodide solution, sp. gr. 2.95) showed that all of the minerals present had a much higher specific gravity than this heavy solution, and consequently that there was no free quartz or aluminum silicate present.

A special chemical test was made for uranium, using ten grams of the ore, but none was found. The radio-activity was tested by an exposure to the photographic plate for eight days, but not the least effect was observed. Therefore neither uranium nor radium occurs in this ore in appreciable quantity. A specimen was submitted by other parties to M. Curie, who pronounced it free from radium.

Assays of the ore are stated to show about $17 in gold and 4 oz. of silver per ton, so that it should be a good commercial proposition if a method can be devised to extract these metals economically from such a highly zinc-bearing ore. The specific gravities of tetrahedrite and galena are higher than those of the other constituents, and it is very probable that the silver, and possibly the gold, are associated with them. The separation of barite from blende would seem to offer a promising field for oil concentration.

Another specimen of luminescent ore has lately been received from Eureka county, Nevada, which consists of galena, barite and zinc-blende. The blende is present in veins a quarter of an inch wide, and also as a granular mixture with the other constituents. It is very light yellow in color, contains mere traces of iron and lead, and pieces freed from the associated minerals exhibit a strong luminescence when scratched. The phosphorescent property has generally been considered as confined to the light yellow variety of blende, but in the Mariposa ore it seems to be of the ordinary brown color, while some light-colored specimens from other localities have been examined and have failed to show this property. Another specimen taken some years ago from the Ute mine, near Rico, Colo., contains small particles of luminescent blende, associated with galena and manganese minerals.

The writers have recently been apprised of three other American localities, one in Colorado, one in Arizona, and one in Montana, where phosphorescent zinc-blende occurs, and doubtless more are known in this country but have never been reported.

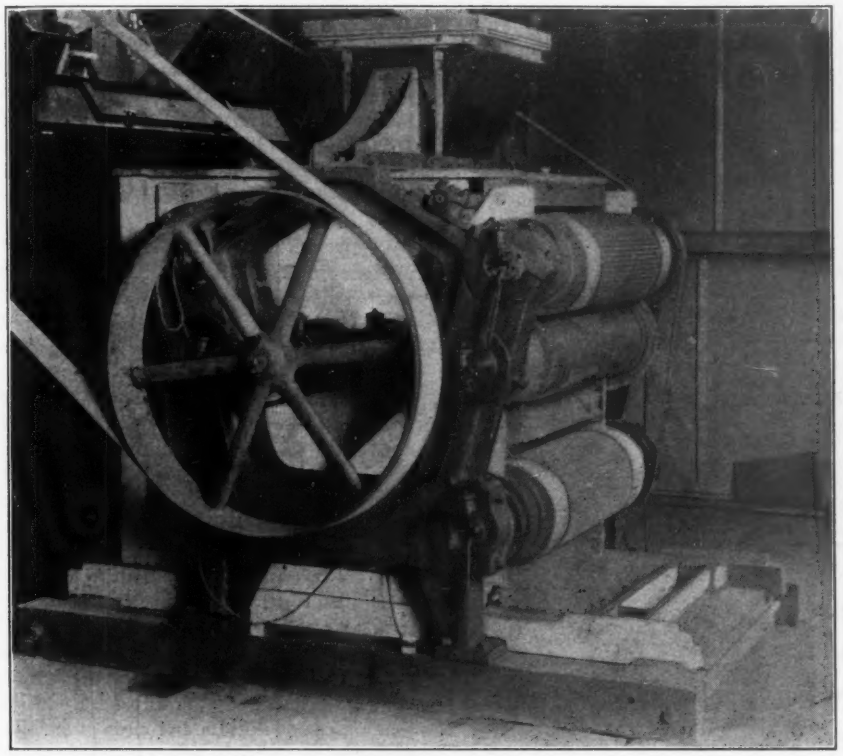
Eclogite is a beautiful but rare rock found among the crystalline schists of Saxony and Bavaria. It is composed of green pyroxene, reddish garnet, and quartz, so distributed as to give a bright variegated appearance. The name is derived from Greek *ekloge,* meaning 'selected,' and has reference to the pleasing display of color produced by the peculiar arrangement of the minerals.

MAGNETIC CONCENTRATION OF ZINC ORE IN VIRGINIA.

BY C. O. PAYNE.

The slight difference between the specific gravities of zinc ores and those iron ores which are usually associated with them, has enabled magnetic separation to establish itself firmly as an ore-dressing process for such material.

The treatment of zinc ores in Virginia, as well as in New Jersey, has been largely aided by magnetic concentration, and it is a notable fact that the first commercial application in this country of the magnetic separation of limonite iron ore from zinc silicate (calamine) was made in Virginia. This was in the spring of 1892 when the Wythe Lead & Zinc Mine Company, at Austinville, Va., introduced a magnetic separator for the enrichment of zinc ore by the removal of limonite which had previously been rendered magnetic by a reducing roast. Likewise, the first application was made in Virginia of the separation of unroasted limonite from zinc ore, when in 1901 the Bertha Mineral Company erected at Delton, Va., about 18 miles from Austinville, a concentrating mill for the treatment of the ores from the Clark bank. In this case the type of separator employed enabled the natural magnetic susceptibility of the raw limonite to be utilized, and by avoiding the necessity of roasting these ores, a far greater economy of treatment was thus secured.



MAGNETIC SEPARATOR USED IN VIRGINIA.

Although a large portion of southwestern Virginia is known to contain zinc ores, only those found in Wythe and Pulaski counties have been exploited seriously. These ore-deposits are situated in the valley of the New river. The ores consist chiefly of the hydrated silicate of zinc, calamine, and the carbonate, smithsonite; by far the larger proportion being the silicate. The ore-bodies are composed both of hard ore, in the form of compact boulders and masses, often concretionary and beautifully encrusted with crystals, as well as soft ore which seems to be made up of loose aggregates of minute crystalline forms upon light yellow and brown clay sheets and nodules. These ores are nearly always found in contact, or in close association with, an impure magnesian limestone, in which they appear to have been originally contained as sulphides. They occur exceptionally in crevices in the limestone, but usually as beds or envelopes, overlying the limestone and in troughs or pockets between limestone chimneys, sometimes of considerable thickness. Overlying and interpenetrating the zinc ores, a blanket of light colored clay is found, between which there is no sharp line of division. This clay is known locally as 'buck-fat' from its greasy feeling; since it forms part of the ore-body, it is mined with the ore, from which it is subsequently separated by washing and jigging. The 'buck-fat' is perfectly plastic when moist; it shrinks and cracks on drying. Upon ignition, it loses from 8 to 12 per cent of water. It appears to be essentially a mixture of the hydrated zinc silicate with clay, more or less colored with iron oxide. Outside this peculiar clay, there is usually a heavy over-burden of dark red clay which forms the general surface of the country, and contains brown limonite ore, to a varying extent at the zinc mines, but abundantly elsewhere in the New River district.

That the limestone has been much eroded where it contains the zinc ores is clearly shown at Bertha, Va., as described by Mr. William H. Case.* Similar evidence is presented at Austinville, where the open-cut method of mining has been adopted, and where the removal of the clay overburden, and the zinc ores overlying the limestone, has revealed a vast collection of projecting limestone columns, domes and pinnacles, of considerable altitude and fantastic shape.

The association of iron and lead ores with the silico-carbonate zinc ores, while general, is irregular, and often difficult to trace, owing to the clay covering. The oldest mine of the group, the Wythe mine at Austinville, has produced for about 125 years both the carbonate and sulphide of lead, while the first spelter made in a Virginia zinc furnace was tapped from the retorts in 1880.

Limonite iron ore occurs with these zinc

*Transactions A. I. M. E., Vol. XXII, p. 511.

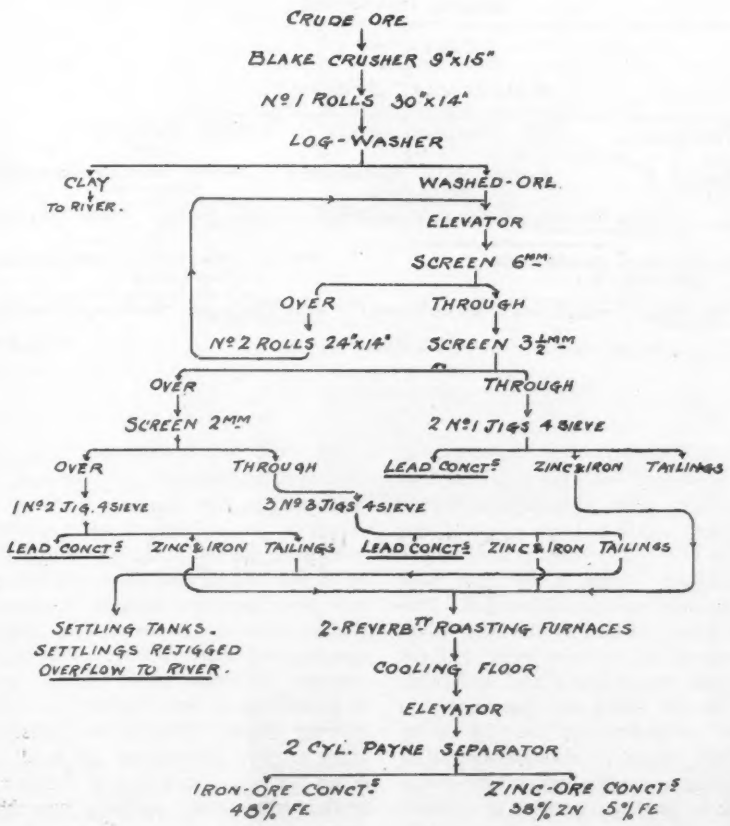


FIG. 1.

ores, either forming a part of the clay overburden, from which it is recovered by stripping and washing, or else in direct and intimate association with the zinc ore-bodies themselves. Writing in 1893 of the Bertha mine, Mr. Case stated that the occurrence of the zinc ores in segregated bodies and their freedom from lead and iron, were unique. In the accumulated piles of retort residues at the zinc furnaces at Pulaski, however, there is evidence to show that previous to 1893, both iron and lead occurred in the ores of the Bertha mine. By jigging samples of the old waste dump material, shots of iron almost completely reduced to metal, together with a certain amount of lead, have been revealed. At the present time, in certain parts of the mine, both iron and lead are known to occur with the zinc ores.

Bertha Mineral Company and a high grade of spelter ore was produced by means of direct magnetic separation.

The accompanying diagram, Fig. 1, illustrates the scheme of ore treatment which has been in use for a number of years at the Wythe mine. The capacity of the mill is about 80 tons of crude ore in 10 hours. For a number of years the tailings from the fine jigs were treated upon buddles with revolving brushes or *kehrherde,* but since an inconsiderable amount of zinc concentrate was secured by such means, the use of the buddles was discontinued, and the tailings were fed into settling boxes, the settlings being re-jigged upon the fine jigs, and the overflow discharged into the river. In this way a large tonnage of zinc contained in the clays has been lost.

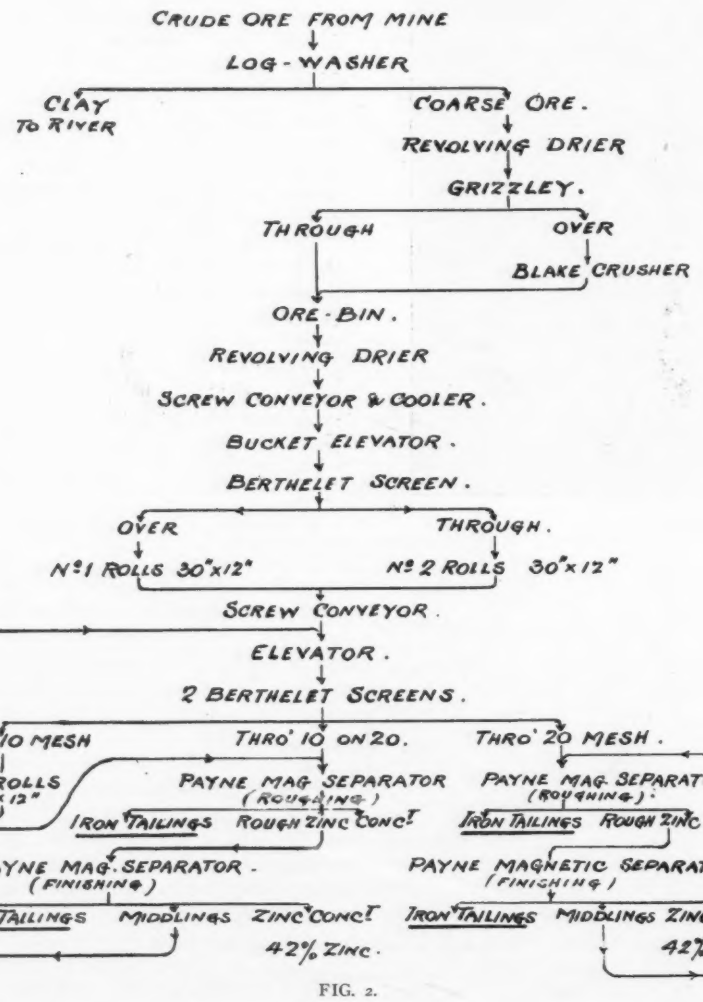


FIG. 2.

At Austinville, limonite of good grade is so abundantly associated with the zinc and lead ores of the Wythe mine, both separate in the clay overburden, and in intimate mixture with the ores, that it has been one of the regular sources of revenue. Again, in the Clark bank at Delton, the same association is noted. This mine was originally leased by the New River Mineral Company as an iron mine, and the clay overburden was stripped and washed to recover the limonite which was then smelted in the blast furnace at Ivanhoe, Va. Increasing depth, however, caused its abandonment as an iron mine, owing to the presence of zinc, which made trouble in the blast furnace, by condensation of the zinc fumes and choking of the flues. This mine was, later on, leased by the

After the lead is separated from the zinc-iron ore, the latter is then conveyed in cars by mules to the roasting furnaces situated alongside the railroad, about a quarter of a mile from the mill. Here it is mixed with 8 or 10 per cent of coal slack and charged into two reverberatory roasting furnaces, with hearths about 7 ft. wide by 8 ft. long, having openings for hand rabbles. This method of roasting, although slow, secures a perfect magnetization of the iron ore. In 1901, a revolving cylinder furnace was substituted in order to save the expense of hand roasting. After the ore is roasted, it is dumped upon a brick cooling floor, partially quenched with water to hasten the cooling, and then passed over the magnetic separator without sizing. The latter was built by the Payne Separator Company in 1896, to replace a smaller sized machine previously in use. This separator is a double cylinder machine, both cylinders being mounted on a wooden frame, one vertically over the other. The magnet inside each cylinder is a bipolar electro-magnet; the curved face of each pole, 10 in. wide, is placed close to the inside of the cylinder shell, along which it occupies a certain arc. The cylinder shells are made of seamless drawn steel tubes 16 in. diam. and about 1-16 in. thick. The upper cylinder is run at a speed of 200 revolutions per min., and produces a clean concentrate containing about 48 per cent iron. The material not attracted by the top cylinder is fed upon the lower cylinder, and produces clean zinc ore, and a certain amount of iron middlings, which are passed through the machine again.

The Delton mill has the distinction of having produced by direct magnetic separation of unroasted limonite ore, and without the aid of jigs or other gravity methods of separation, a richer zinc concentrate than had heretofore been obtained from any other Virginia zinc ore. During the months of October and November, 1902, 2,336,900 lb. were produced, which averaged 43.16 per cent zinc and 6.5 per cent iron. At times, the concentrates have contained as high as 46 per cent zinc.

The ore from the Clark mine contains so intimate a mixture of limonite and calamine, that fine crushing is required to unlock the minerals. Fig. 2 illustrates the scheme of ore treatment adopted at the Delton mill for the concentration of zinc ore from the Clark bank. The four magnetic separators are arranged tandem in pairs, the first pair producing a rough zinc concentrate and clean iron tailings, while the second pair, which re-treat the rough zinc concentrate, produces therefrom a clean zinc concentrate, and a certain amount of middlings, which are re-passed over the first set of machines.

The design of these separators is based upon my discovery that in the separation of feebly magnetic minerals, such as limonite, garnet, etc., a very powerful or dense magnetic field is not so important as one in which the position of the lines of force are so controlled that great differences of magnetic density are established therein. Experiments showed that limonite and practically all the feebly magnetic minerals could be attracted and moved in the field of a 10 in. horseshoe hand magnet, when the lines of force were made to diverge properly.

Fig. 3 gives a small section of the separating cylinder, in order to illustrate the application of the principle employed. The cylinder itself is made of non-magnetic material of a high electric resistance, and is provided with a series of grooves on its surface, in which are fitted thin soft steel plates having toothed edges. When the separating cylinder is made to revolve through a magnetic field, the laminated construction of the cylinder's separating surface largely suppresses Foucault currents, which would cause resistance to its motion, while the toothed edges of the plates cause the lines of force to be so diverged, that the particles of limonite can be attracted and held while in the field. Fig. 4 and 5 show a part sectional and a longitudinal view of the machine, without the casings.

The separators have a large capacity, as they treat an ore sheet 48 in. wide, one-half of which is fed to the separating cylinders placed

on each side of the machine, from a central hopper. The ore is made to pass through two successive fields, arranged vertically, after it is fed from the hopper. The upper field is formed in a narrow air gap between two stationary electro-magnets, each of which is placed inside a cylinder, the top one being the separating cylinder, while the lower one, of brass, is the feed cylinder, from which the magnetic particles, when brought into the field, are attracted by the separating-cylinder and conveyed over a division plate, where they are discharged upon leaving the field, thus separating them from the non-magnetic particles. The lower field is somewhat more powerful than the upper. It is established in an air gap between two opposing pole pieces, one of which is connected with an external electro-magnet, and the other with one contained inside the separating cylinder. The material is here fed directly upon the upper part of the separating cylinder, and by means of a non-magnetic guide-plate connected with the outer pole-piece, is conveyed into the field which is situated just below the horizontal diameter of the cylinder. Very feebly magnetic ore particles, or middlings, are, in this way, afforded ample opportunity of being brought into direct contact with the cylinder's magnetized surface, and are thus more easily separated.

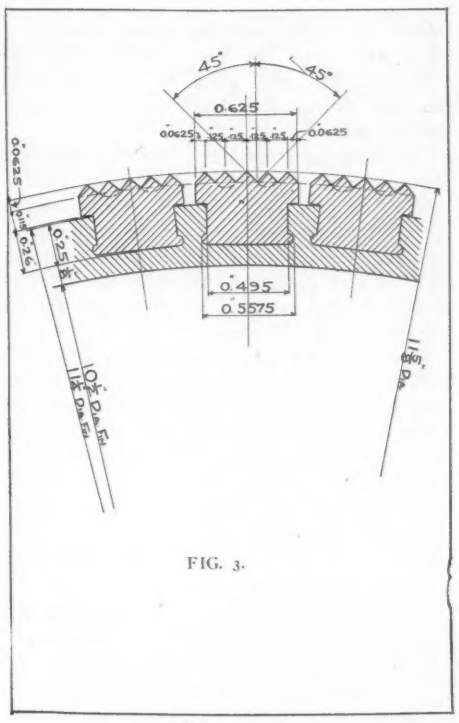


FIG. 3.

All the machinery of the Delton mill, with the exception of the magnetic separators, was supplied by the Allis-Chalmers Company. The separators were designed and built by the Payne Separator Company of New York. A more recent type of separator, built by the same company, indicates that still better results are obtainable, especially in the separation of those feebly magnetic minerals which require fine crushing to unlock them completely from their associated gangue minerals.

THE PRESERVATION OF WOOD.—As a result of recent experiments in the treatment of wood to preserve it from fire and decay, Mr. Joseph L. Ferrell (*Journal* Western Society of Engineers, February, 1904) advocates the use of aluminum sulphate as a preservative agent. This compound, it is claimed, possesses antiseptic and preservative properties and has the additional advantage that it remains permanently in the wood. The strength of the solution used is about 15° B. In treating ties and other timbers, where it is essential that they should be made proof against decay as well as fire, a certain quantity of ferric sulphate is added to the solution. In either case the solution is applied under a pressure of from 450 to 600 lb. per square inch, the pressure being varied according to the character of the wood under treatment. No preliminary steaming or vacuum process is employed. Wood treated in this manner when subject to intense heat will char at point of contact, but will not burst into flame and the destructive effects of the heat will be confined to the point of contact.

In impregnating wood to render it fireproof, cylinders of moderate dimensions are used, each holding a timber of commercial size. The cylinders are of cast steel and tested to 1,000 lb. pressure. At each end of the cylinder is a gate internally sealed and moved vertically by hydraulic power. The treatment lasts about half an hour for one inch planks, while larger sections require longer time. The average cost of treating wood is about $9 per 1,000 feet.

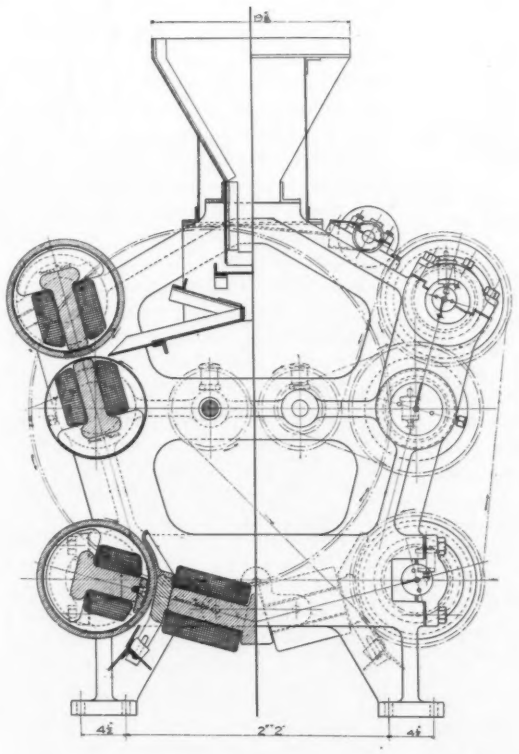


FIG. 4.

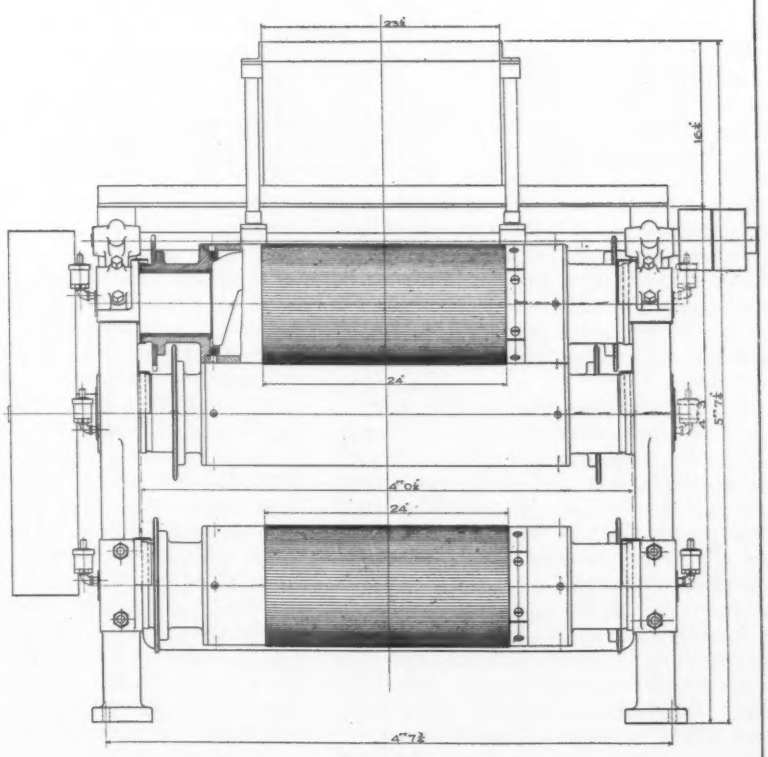


FIG. 5.

PYRITE SMELTING. A REVIEW.—IV.

By EDWARD D. PETERS.

THE SAVING OF COKE IN PYRITE SMELTING.

The question, "To what extent can fuel be eliminated?" cannot be answered categorically, if it is to convey accurate information. It can be said in a general way that, other things being equal, the percentage of coke to be used in any given case stands in inverse proportion to the oxidizable constituents of the charge. Or, in plain language, when a charge contains its own fuel in the shape of iron sulphides or arsenides, we need not add so much outside fuel to melt it. And it is not only that we are not *obliged* to use as much extraneous fuel; we can not use it, if we expect to get any reasonable degree of concentration.

If an ore is full of sulphides, and we desire to obtain a fairly concentrated matte, the only way that it can be done is to burn the sulphur to sulphur dioxide and send it out of the stack; and burn the ferrous sulphide to ferrous oxide and send it into the slag; and this object cannot be accomplished unless two conditions are present: 1. An oxidizing atmosphere; and 2. an excess of free silica.

To obtain this oxidizing atmosphere, we must reduce the coke until, when blowing a reasonable blast into the furnace, there will be enough oxygen not only to burn the coke, but also to produce a highly oxidizing atmosphere with which to burn the sulphides; for, when an atom of oxygen has to choose between an atom of glowing coke and an atom of glowing sulphide, it prefers to combine with the coke, and the sulphide simply melts as ferrous sulphide and goes into the matte as such, and it is only the *excess* of oxygen that acts upon the sulphides. Consequently, when smelting a heavy sulphide ore, with the determination of obtaining a considerable degree of concentration, the question "How much can I cut down the coke?" is an entirely inappropriate one. It actually seems to me sometimes that it would be more correct to ask: "How much coke do I dare to use?" For the experimenter will soon find that it is the degree of concentration required that will answer these questions. Assuming that other conditions are favorable, and that he has ample free silica in his ore, he must keep carefully lessening his coke until the required degree of concentration is attained.

It is nervous work when one first tries it; but, if the charge is suitably made up for genuine pyritic work, it will be found that, although the behavior and the interior appearance of the furnace will exhibit marked changes as it shifts its fuel from coke to sulphides, the smelting will proceed satisfactorily, though slowly, and the supply of heat will be ample. I will indicate, however, one danger to be avoided, as it has been the cause of trouble in several experiments that have come to my knowledge, namely, as the coke is lessened, the limestone (if such is being used), must also be lessened, or the silica increased—which is virtually the same thing. Reference to this point will appear too elementary to the contributors to this discussion, but it will be useful in many instances. This necessity of lessening the limestone, or increasing the silica, arises, of course, from the fact that, as the proportion of coke is lessened, the sulphides are burned more vigorously, and the resulting ferrous oxide requires silica to slag it. The charge, therefore, is now more basic than it was when coke was being burned as a fuel, and, unless the ferrous oxide is offered the necessary free silica to combine with, troubles will arise, and the degree of concentration will drop again.

An oxidizing atmosphre is the distinguishing characteristic of pyrite smelting, and heat is one of its principal products. Consequently, an ore that contains considerable quantities of suitable oxidizable constituents, such as pyrite, is capable of yielding considerable quantities of heat, and thus requires but little coke for its smelting; and *vice versa*.

Austin speaks very conservatively as to the extent to which carbonaceous fuel may be reduced, and states that, with an abundance of sulphide ore, the amount of coke has been cut to 6 per cent and less. No doubt he is referring solely to cases where there is a tolerably high ratio of concentration, (and consequently, a silicious charge), for much so-called pyritic smelting has been done for years with one-third as much fuel as this.

Beardsley comes direct from the great Mount Lyell smelter, where there is a maximum amount of sulphides, and where the ratio of concentration is moderate, say 7 to 1, and tells us that, when running with a portion of the charge consisting of certain ores, 2½ to 3 per cent coke is required, while, with the same proportion of the charge consisting of certain other ores of an almost identical *chemical* composition, the charge is smelted with from 0.3 to 0.4 per cent coke. This result is, so far as I am aware, the lowest point to which the proportion of coke to charge has been reduced, with anything like this ratio of concentration, and with campaigns of from 60 to 80 days. The result is also attained with an unheated blast.

Beardsley adds: "At Mount Lyell, as the charge column was gradually raised, and the blast increased, the stove heat was taken off, until, finally, stoves were not used at all." This shows positively that, with a high ore-column, a powerful blast, and heavy pyritous ores, the furnace may make long campaigns on a coke charge of less than one-half of one per cent, providing the physical make-up of the ore is suitable.

Let us see what physical condition of the ore is *unsuitable*, as this is an important point, and one that we have but little information on, in connection with pyritic smelting. Every one will agree that the presence of a considerable proportion of fines is quite disadvantageous in any kind of smelting in the blast furnace. It is doubly harmful in pyrite smelting, and is especially emphasized by Nutting, who suffers from having most of his sulphide ores in a finely divided condition. These fine, heavy, fusible sulphides run down between the coarser lumps of ore until they reach the smelting zone, while an infusible silicious skeleton is left behind. Beardsley, however, calls attention to a still different circumstance, and one which appears to have a much greater influence upon the process than we should anticipate, especially considering the enormous furnaces and powerful blast at the Mount Lyell plant. His ore consists of a massive pyrite, to which must be added sufficient silica and earthy bases to form a suitable slag. He describes two different kinds of silicious ores which are employed as a flux. The first kind consists of a silicious aluminous schist, containing from 4 to 8 per cent copper as bornite, and about 5 per cent iron as pyrite. The sulphide minerals in this schist occur in concentrated and isolated patches throughout the gangue, and when this class of ore is used as a silicious flux, the campaigns are short, and the charge requires 2½ to 3 per cent coke. The second variety of silicious flux is also a schist, having approximately the same chemical composition as the preceding ore, except that it contains about 8 per cent iron, and only 1½ per cent copper. But in this schist, the sulphides are disseminated in little grains pretty evenly throughout the gangue. When using this second variety of schist, the campaigns last from 60 to 80 days, and only 0.3 to 0.4 per cent coke is required.

I think that I am fairly interpreting the replies to this question when I say that, in pyrite smelting, the proportion of coke may be reduced to almost nothing in the case of heavy sulphide ores of favorable physical make-up, and where the ratio of concentration is not very high, and that the amount of coke increases as the proportion of sulphides diminishes, and also increases (within narrow limits) as the degree of concentration increases; but, that even with high concentration, and with quite a low proportion of sulphides, a marked saving in coke is effected by running the furnace pyritically.

NICKEL ASSAY.—Mr. Donald Clark states, in *The Australian Mining Standard*, that the Smelting & Refining Company of Australia, at its Dapto works, tried many processes for a speedy and reliable nickel assay. Gravimetric processes took too much time; electrolytic methods were unsuitable, so a process was tried based on Moore's that if an ammoniacal solution of nickel is treated with potassium cyanide, then a double cyanide of nickel and potassium will form. As an indicator, a minute quantity of silver iodide is suspended in the solution. Silver iodide is insoluble in ammonia, and only dissolves in potassium cyanide solutions when the double nickel potassium cyanide has formed, so that the clearing of the solution indicates the end of the reaction. The amount of potassium cyanide necessary for clearing the solution may be exactly estimated by adding a standard solution of silver nitrate from another burette until the solution is turbid again. The process may be simplified by adding a small quantity of silver cyanide to the potassium cyanide solution and running this into an ammoniacal solution of nickel containing potassium iodide. The solution becomes more and more turbid until the potassium nickel cyanide is all formed, after which it gradually clarifies. By standardizing with a pure nickel salt and with pure silver nitrate the value of the cyanide solution, as compared with nickel, may be accurately obtained. The method has proved satisfactory on New Caledonian ores, except when a large amount of iron is present. Of course, with copper, zinc, manganese, or such metals as behave similarly to nickel in ammoniacal solutions, the method would be useless.

The most important coal field of Russia is the Donetz basin which furnishes about 70 per cent of the output of the whole country. The field is situated partly in the territory of the Don Cossacks and partly in the government of Ekaterinoslav, and comprises an area of 25,000 square versts. In quality the coal ranges from anthracite to inferior grades of bituminous.

WEST AUSTRALIAN MINES.*

BY J. H. CURLE.

The real value of a gold mine rests upon the ore blocked out, or, rather, upon the estimated profit to be earned from working that ore. On this basis, the big mines of the State are at present not overvalued; as mines go, the Oroya, Kalgurli, Boulder, Boulder Perseverance, Ivanhoe, Horseshoe, Sons of Gwalia, and Fingall show in their ore reserves reasonable security for the market values of the respective shares. The obvious reply of the pessimists to this statement is that in at least several of these mines the official figures about the ore reserves are all wrong. This brings us at once to the personal equation governing mines, and, though I don't like, as a rule, to discuss mines from the personal standpoint, I think some good may result by doing so in the present case.

The personal equation about a mine is a thing reducible to a most simple formula. You have, firstly, a manager, secondly, an orebody. You—that is to say, the shareholders—must look after the manager, and the manager must look after the ore. If you find the right manager, you find a man who is capable and honest. If he is capable, he gets at the correct quantity and value of the ore; if he is honest, he conveys that information to the mine owners at the earliest moment. That is the whole thing in a nutshell. The value of the ore is, of course, the one fact of supreme importance in a mine, and I cannot conceive of any manager, especially of a big mine, not realizing that his whole existence and reputation depend upon his getting at the correct figure. A manager who left all his sampling to his mine foreman or his surveyor, or who never took check assays to test his assayer, would be, in my mind, a fit inmate for a lunatic asylum; and that any of the men who now hold the positions of managers of the big West Australian mines should have acted in this way I find it impossible to believe. In the earlier days of the field, so many of the subordinate officials on the mines were "got at," that I should imagine the managers have by this time this particular form of bribery on the brain, and they are not the men I think them to be if they are still taking any risks in this respect. In the earlier days, it will be pointed out, there were managers in West Australia who were themselves dishonest. I do not deny this, but I believe those weeds have now been eliminated from the bigger mines, and replaced by altogether higher class men, who, in the struggle for the survival of of the fittest, have come to the top.

Now, I happen to know all the managers of the mines referred to, some of them intimately, and I only wish that the pessimists could come into personal contact with these men. I think they would realize, after seeing their mines and their assay plans, that gold mining in West Australia to-day is taken as a most serious business, and that anything like carelessness in the estimation of quantities and values, whereby these men might lose their positions and reputations, is very far indeed from their thoughts. Of course, a mine may be honestly and capably handled, and yet turn out badly in depth. It is conceivable (though I don't suggest for a moment that it will happen) that these big mines may never open up any more pay ore than that which is already blocked out. The blocked-out ore in these mines I accept as a fact—both as to quantities and value—because I know and believe in the managers; but neither they nor I can tell what is the value of unexposed ore. If these mines, then, were to go wrong in depth, and to produce nothing outside the present ore reserves, it would be a regrettable thing, but it would not be "another Westralian scandal."

The ore reserves of these eight mines—which I believe to be the eight most assured mines in the country—I hope to deal with shortly in an analytical way. In the meantime, I will just call attention to the official statements. This year, the Fingall, Oroya, Ivanhoe, Gwalia and Horseshoe have made definite statements about their reserves. These figures I accept implicitly, and I believe that the profits these reserves foreshadow will be realized. The Great Boulder has not yet issued its report, but I am sure its reserves will be greater than they were last year, and I also consider that mine's statements worthy of all credence. The Kalgurli manager, whose work otherwise I look on as very good, states in his last report that the reserves were "sufficient for five years." That statement was made in good faith, but a more precise statement of the number of tons and their average value is in these days expected from the manager of so good and so conservatively managed a mine as the Kalgurli. I think the directors would not go wrong in asking the manager for a supplementary report containing a more precise statement about the ore reserves, which shareholders can keep for reference during the coming year. As regards the last of these mines, the Perseverance, it has never been the policy of the directors to issue precise statements about ore-reserves and their position. This I often pointed out; but the shareholders were evidently quite satisfied with their current dividends, and did not worry about the future. The financial control of the mine has now passed to other hands, and the general management also. The new managers wisely believe in letting all publicity into the affairs of their mines, and we shall probably hear in a few days what their estimate is of the Perseverance ore reserves. If it does not come up to shareholders' expectations, I must ask them not to blame people indiscriminately, and not to talk about "scandals." The blame, in a case like the Perseverance, rests with the shareholders themselves more than with anybody else. When the directors stopped publishing the assays, the shareholders never protested; indeed, at their annual meetings they used to shower adulation upon a board who kept from them much that they were entitled to know. I have not a great deal of sympathy with the shareholders in this mine, but I will just say this, that the Perseverance is still a great property, and its future in depth is likely to be better than many people try to make out.

*Abstracted from *The Economist*, June 4, 1904.

KOREAN SUPERSTITION IN MINING.

BY AN OCCASIONAL CORRESPONDENT.

A Moo T'dong is a Korean sorceress whose presence and performance is indispensable at a house in which there is sickness. She is usually attended by female assistants, whose duty it is to beat a drum and cymbals. Her religious devotions, for such they are considered, consist of praying, singing and dancing, attired in the most fantastic costume, and her presence at any particular feast is a signal for an immense gathering of country people, who follow the rites with interest, and believe sincerely in a happy termination of their immediate troubles.

A MOO T'DONG IN KOREA.

A series of accidents called for the following petition from the native foremen of a mine; "We undersigned foremen beg to state that the wounds and deaths have been taking place quite often in the mine which we think they are causing by having no pray. In discussing the matter, we think it would be the best idea to call for Devils and send them away by giving a good treatment. Therefore we are going to subscribe some money among ourselves and make a feast for the Devils and then send them away so as there will be no more accidents. Your approval will oblige us.

Yours respectfully,

YI CHANG SUN,
KIM IN HAK,
PAK NOK SUNG,
CHANG MIUNG WOON,
KIM KIUNG WHAN."

This feast was attended by a Moo T'dong and, strange to say, for four months after the feast there was not an accident of any kind. One therefore cannot wonder at their faith in such ceremonies.

THE GRANBY MINES AND SMELTER.

BY OUR SPECIAL CORRESPONDENT.

The reduction works of the Granby Mining, Smelting & Power Company, situated at Grand Forks, B. C., are treating approximately 2,000 tons of ore per 24 hours. The supply comes chiefly from the company's mines at Phoenix, 20 miles away, but a good deal of custom ore also is treated. The ores contain from 32 to 42 per cent silica, 15 to 20 per cent lime, 12 to 25 per cent iron, 2½ to 5 per cent sulphur, 1½ to 2 per cent copper and $1.75 to $2 gold per ton, with 25 cents in silver. The copper occurs as chalcopyrite, the iron as pyrite and magnetite.

The ore is received from the mines in 30-ton bottom-dump cars, being weighed and discharged from a high trestle; then it is allotted, classified, sampled and conveyed to the mill bins; from the bins it is drawn into dump carts, to be unloaded into automatic charge cars, into which the necessary coke also is fed. While being loaded, these cars are at the foot of an incline, below the level of the feed floor; when the charge is made up, consisting of 2,200 lb. of ore and from 11 to 13 per cent coke, the car is drawn up the incline to a position within the top of the furnace and there emptied. The three cars which do this work are each 5 by 14 ft. in size, holding 2½ tons of material, drawn by an electrically operated double-drum hoist. The composition of the ore is such as to supply all the requirements for a smelting mixture. There are six furnaces, each 44 by 150 in. at the tuyeres, with a capacity of 300 to 400 tons each per 24 hours. The furnace discharges into double settlers, the first being 5 by 7 ft., holding 10 tons of matte; the slag overflows from the first to the second. The slag is hauled away in cars drawn by steam locomotives; formerly, it was granulated and carried away by a launder of water, but this was discontinued because there was no suitable place for deposit, the laws of the province forbidding the diversion of slag into streams.

The matte is drawn from the settlers into 5-ton cast steel ladles; these are carried by an electric traveling crane to the converters, of which there are two stands, the shells being 70 in. by 100 in., lined with a composition of clay and silicious gold ore from the Republic district. In the converting process the iron slag is skimmed off, cooled and re-smelted, containing as it does from 1 per cent to 3 per cent copper and running heavy in iron. The matte, as it is drawn from the settlers, will average 42 per cent copper and the converter product is a blister copper, running from 98½ to 99½ per cent copper. The electric traveling crane in the converter room has 40 tons capacity and a 40-ft. span; the one in the furnace room has 10 tons capacity, with a 24-ft. span. The converter blast is supplied by a Nordberg blowing engine, electrically driven; the furnace blast is produced by six Connorsville blowers, driven by electric motors. There are three 100-h. p. and four 75-h. p. motors for this work. The main stack is 11 ft. square, interior dimensions, and is 152 ft. high; and between the stack and the furnaces there is a 10 by 11 ft. flue chamber, 1,000 ft. long. The dust, collected therein, is briquetted in a Henry S. Mould machine and added to the charge.

The product of the plant is 30 to 35 tons of copper daily, with its accompanying gold and silver. The smelter was designed by Mr. A. B. W. Hodges and erected under his directions in 1899, and since then he has been superintendent. The company has its own electric power plant on the north fork of the Kettle river, but it is also able to draw upon the Cascade power plant, situated on the main stream a few miles below Grand Forks. The Granby company expects soon to have connection with the Great Northern railroad at both mines and smelter, as that railroad is extending its lines from Grand Forks to Phoenix, and to the smelter, and is also building from Curlew, on its Republic branch, to midway on the Boundary creek, a short distance from Greenwood.

The Granby mines at Phoenix are developed by open cuts, shafts and adits, all of them on the same ore belt, which strikes nearly north and south through a diorite country. Adits, or levels, No. 1, 2, 3, and 4, have been driven on the strike of the ore body a distance of about 1,500 ft. in each instance. The workings from each level are connected, so as to cover a total working depth of about 400 ft.; the top level gives a depth of 325 ft. below the crest of the hill, making a depth of approximately 725 ft. vertically from the highest surface point to the lowest level. The open cut work is mostly at, and above, No. 1, level, where the ore is blasted and loaded into cars by specially constructed steam shovels. The two main shafts, 254 ft. apart, are 400 ft. and 200 ft. deep respectively; the collars of each are 400 ft. below the crest of the hill, that is, between No. 1 and No. 2 levels. From 800 to 1,000 tons of ore daily are hoisted from the 400-ft. shaft. The workings, as appeared from a brief visit underground, disclose an ore body fully 200 ft. wide, the ore being systematically blocked out and the worked-out stopes well timbered. On the lower levels, however, timber supports are largely dispensed with, pillars serving that purpose; the ground is firm and holds up well, so that this system is feasible. The mine-work has been, almost from the beginning of serious development, under the superintendency of Wm. Yollen Williams, assisted by O. B. Smith as engineer and surveyor. The duplex 60-drill air compressor, operated by two electric motors of 700 h. p. each, furnishes air for the drills and for the two hoisting engines at the shafts. The motors are connected to the compressor by rope drives. Mr. Jay P. Graves is general manager of the Granby Company, with offices at Spokane, Washington.

CANADIAN PRODUCTS FOR AMERICA.—Exports from Canada to the United States in April and the 10 months since July, 1903, included the following:

	April.		Ten months.	
	Quantity.	Value.	Quantity.	Value.
Arsenic, lb.	.....	.....	600	$39
Asbestos, tons.	2,163	$61,426	20,702	583,084
Chrome ore, tons	25	300	1,423	32,268
Coal, tons	88,958	215,370	1,181,303	2,996,705
Copper in ore and matte, lb.	3,225,766	352,435	35,979,813	3,525,360
Copper, black, cement, etc., lb.	.....	.....	203,560	25,197
Feldspar, tons	475	1,226	7,085	13,927
Gold	.....	515,297	.....	15,026,739
Graphite, tons	30	675	115	3,832
Iron ore, tons	.....	.....	228,982	572,543
Lead in ore, etc., lb.	336,849	7,138	13,130,077	286,390
Manganese ore, tons	35	974	68	2,294
Mica, lb.	88,222	19,844	485,347	116,546
Nickel in ore and matte, lb.	666,730	50,638	10,239,793	810,653
Pyrites, tons	847	2,726	15,461	38,972
Salt, lb.	2,700	11	1,537,298	4,480
Silver, oz.	99,818	56,912	2,728,213	1,599,147
Total value	.....	$1,284,972	.....	$25,638,185

It is interesting to mention that the trade with Great Britain during the 10 months was valued at only $366,449.

THE WOOD RIVER DISTRICT, IDAHO.

BY OUR SPECIAL CORRESPONDENT.

One of the interesting properties in this district is the Minnie Moore, near Bellevue, on the west side of Wood river, which covers a portion of a well-defined fissure, striking northwest-southeast along the contact of lime and diorite. The croppings of this fissure are visible for some distance northwesterly from the Minnie Moore group. The mine was a rich producer of high-grade silver-lead ore from 1882 to 1888, but all work ceased in 1889, the property remaining idle till 1901, when Mr. I. E. Rockwell and associates purchased it. The former management had sunk a 30-degree incline on the vein to a depth of 900 ft., had run levels northwesterly from the shaft on the vein and stoped out most of the ore from the 900-ft. level to the surface, the work disclosing a well-marked vein of galena and silver between a diorite hanging-wall and a limestone footwall. At the 900-ft. level, the vein was lost through a faulting in the formation, whereby the vein was thrown 150 to 200 ft. to the southwest, where it was afterwards found to have resumed its normal dip. The old management did some exploring, but failed to discover the ore in its changed position, and the mine was abandoned. Mr. Rockwell, on assuming control, unwatered the mine and began cross-cutting on the 900-ft. level, encountering the vein at a point 200 ft. southwesterly from where the break began. This work shows that the connection between the two vein sections was not actually cut off, as the vein had rolled and raised and flattened in its course before again taking its regular dip. Subsequently the ore was opened by driving a cross-cut from the 1,000-ft. station through the lime footwall, which at this depth had shared in the faulting movement. From a drift on the 1,000-ft. level a winze was sunk about 200 ft. on the vein, a compressed-air hoist operating at that point. Thorough development is in progress between the 900 and 1,000 levels, much of the ore being blocked out. In various drifts and stopes faces of ore appear ranging from 3 to 10 ft. in width, rarely narrowing to less than 4 ft. The ore is a striated steel galena, the first-grade of which runs 70 per cent lead and 110 oz. silver, smelter returns showing these figures to be averages of car-load shipments. The second-grade ore, which is usually separable from the first in the mine, is concentrated on the ground, the mill work reducing 4 tons to 1 ton, making five jig sizes and two table sizes, the slimes passing to a Wilfley slimer. The resultant product is in two grades, the first running 80 oz. silver, 65 per cent lead; the second running from 40 to 50 oz. silver, 12 to 15 per cent lead, 25 per cent iron and 10 to 15 per cent excess of silica. The water for mill work is raised from the workings below the 1,000-ft. level by a compound duplex Knowles pump, stationed at the 900-ft. level. On the surface is a double-reel steam hoist, air-compressor and machine shop. The manager, Mr. I. E. Rockwell, states that a modern concentrating plant is to be erected on the property this season. Mr. Lyttleton Pryce, Jr., is metallurgist at the property, with Mr. J. M. McPherson as general foreman. The Idaho Consolidated owns 16 adjoining claims on the northwest.

The Consolidated Virginia group, lying still farther to the northwest of the Minnie Moore, on the same mineral belt, is being developed by the Alturas Mining Company, which is managed by Mr. F. C. Mandell, of Hailey, the

work being in direct charge of Mr. A. Griffith, of Bellevue. The work is not sufficiently advanced to determine the merits of the property.

The Oswego mine is in Oswego gulch, and is in charge of Mr. I. S. Weaver, of Bellevue, whose associates in the enterprise are Baltimore people. Mr. Weaver reports 2,500 ft. of development work, which includes a 350-ft. drift on a vein that has been intersected in depth by a cross-cut. Some ore has been shipped which ran well in lead and silver.

The Della Mountain Mining Company's property is locally known as the Idaho Democrat. Its location is five miles westerly from Hailey, the management being in the hands of Mr. W. L. Sinton, of Hailey, interested with him being Messrs. I. E. Rockwell and Leo Cramer. The holdings are on the eastern slope of Della mountain and cover a fissure vein which is entirely in the granite, the ore streak ranging from 4 in. to 3½ ft. in width. The ore consists of steel and cube galena, some of the assays showing 120 to 166 oz. silver and 60 to 80 per cent lead. It is nearly all a shipping ore, which in this district means that it runs not less than 10 oz. silver and 60 per cent lead. The property has been operated since 1898.

The Compensation group is in Colorado gulch, the work thereon disclosing a contact vein between the lime and granite. It is situated two miles from Hailey and is owned by Mr. L. A. Dithmer, of Hailey. Work to the extent of 4,500 ft. has been done, showing a ledge of great width, with rich shoots of ore therein. The ore is said to sample as high as 100 to 240 oz. silver and 70 per cent lead. The silver usually runs not lower than 2 oz. to each per cent of lead.

The Lipman tunnel is a project of which Mr. M. H. Lipman, of Hailey, is manager, with Mr. E. R. Somers, of Hailey, as superintendent. It is proposed to drive a 3,000-ft. tunnel from a point in Red Elephant gulch in a northwesterly course to cross-cut the Red Elephant-Point Lookout vein, which parallels the Jay Gould-Mayflower-Bullion vein, both of which strike northwest-southeast through Lookout mountain. The Bullion, Mayflower and Jay Gould mines have been among the heaviest producers of the Wood River district. They are in Bullion camp, some five miles west of Hailey. They were developed from the Bullion gulch side; and it is proposed to open the Red Elephant-Point Lookout vein by driving a cross-cut from the opposite side that will give 1,500 ft. depth on the vein, which is in the contact between quartzite and lime. The ore is the characteristic silver-lead ore of the district.

The Star mine belongs to Messrs. Lemp & Falk, of Boise, and is in charge of Mr. A. Richardson, of Hailey. The veins opened are on the lime-granite contact. The group lies a mile northwest from the Minnie Moore. An adit, now in 1,800 ft., is being driven to connect with a shaft. Cross-cuts from this adit are being driven to parallel veins.

Shipments of Wood river ores from Hailey and Bellevue, for the year 1903, contained 6,157,956 lb. of lead and 385,193 oz. silver, the ores averaging 60 per cent lead and containing from 1 to 3 oz. silver to each 1 per cent of lead.

Joints are the divisional planes in a rock; they cut across the bedding or other main structural lines, and they are farther apart than the cleavage, lamination or foliation.

RECENT IMPROVEMENTS IN THE MANUFACTURE OF SULPHURIC ACID.*

By Oscar Guttmann.

The ordinary kilns for burning pyrites have been generally superseded by mechanical furnaces, which, however, have the disadvantage of making much dust, necessitating large dust chambers. The dust chambers do not always work satisfactorily, wherefore some factories have abandoned mechanical roasting, but the trouble is overcome by the employment of tangential dust chambers.

It is becoming the general custom to line Glover towers with segments of volvic lava. This gives a small number of joints, and the structure is not liable to collapse or bulge out like brick work. A perfect filling material, however, is yet to be found. Cylinders are condemned, but they are better than brick if properly built up. Bricks having an opening in the center and channels on the top, so as to retain a layer of acid, act fairly well. In America quartz filling is preferred, because it is more easily cleaned from the large quantity of dust produced by the mechanical furnaces.

Glover acid is really spoiled by having to run over accumulated dust sludge, whereas if the dust were successfully collected in chambers or by filters or other means, even perhaps at the expense of re-heating the gases, better acid for a good many purposes could be obtained.

The use of nitrate ovens is dying out. They are now practically unknown on the Continent, where the universal practice is to charge the nitric acid through the Glover tower. This enables the admission of the nitrous gases to be regulated more accurately, and has resulted in much economy.

Coke filling for the Gay-Lussac towers has given way almost universally to material which is not attacked by the nitrous vitriol. Rings, saucers, and all kinds of moulded pieces of earthenware are now carefully and symmetrically placed in them; they generally allow the gases to pass through too rapidly, and therefore, high towers are required. Plates and hollow balls are gaining ground for absorption towers, and are certainly more efficient. It is now the practice to make two short Gay-Lussac towers instead of one high one; this is more rational, since the gas is less likely to follow a straight course, and thus better absorption is secured, while there is always a tower available should one require repair. A further saving of niter is accomplished by the employment of a central Gay-Lussac tower which takes the excess gases of two or more sets; this is now becoming a general practice.

Intermediate towers show a very high producing capacity per cubic foot as compared to chambers, but they cannot entirely replace the chambers. Their proper function is to promote chemical and mechanical reaction, while the chamber gives the mist of acid the requisite time and space for separation. Where the gases are still hot, as immediately after the Glover or after a first short chamber, the Gilchrist towers are very efficient. When, however the temperature does not exceed 80°, plate towers are more to be recommended, and hollow balls as filling material will stand a temperature even beyond 100° quite well, while the reaction in such towers is undoubtedly more energetic. Intermediate towers have allowed considerable reduction in chamber space, or in the case of existing plants, large increase of output. Small chambers instead of very long ones have now become the rule, and at present the tendency is to make the height greater than the width. A plant recently constructed had chambers 5.5 m. wide and 9 m. high, the longest of the series being 25 m., while the shortest was only 7 m. in length. In recognition of the theory that the chief function of the chamber is dissipation of heat, means for artificial cooling have been introduced. It has further been recognized that efficient mixing of the gases is essential to get a good reaction, apart from the cooling action of the chamber. This has been accomplished by improvements in the chamber connections, by the use of mechanical draft and by the introduction of the Meyer tangential chambers.

Fans, introduced first in America and later in France and Germany are coming more and more into use. They make the working of the chambers absolutely uniform and independent of the outside temperature and wind, which seriously affect the usual chimney draft. There has been a good deal of discussion as to whether the fan should be placed in front or at the end of a system. Some have advocated one position, some the other, and some have advanced the idea that it really does not matter. A fan at the end of a system will only induce a regular quantity of gas at a definite speed. When, however, a fan revolving at high speed throws a volume of gas of high initial velocity and pressure into a large chamber, the gases are hurled against those which are comparatively stationary in the chamber, and the result must be a great mechanical effect, which is bound to promote both the chemical reaction and the separation of the liquid from the mist. Naturally this will take place only at the front end of the chamber, and there will be a calm at the rear end, which is also quite useful. The fact that every tower, whether a Glover or intermediate, produces large quantities of acid by the mere impact of the current of gas against obstructions, indicates the correctness of this view. Every fan observed, when not placed at the end of the set, separated a good deal of acid, and even when placed between the burners and the Glover, there was a copious production of acid, due almost exclusively to the violent contact and interaction of the molecules. It is further one of the reasons why a tangential chamber gives better results.

Iron fans may be used between the burners and the Glover tower, as at Richmond, Va. Fans placed between the Glover and the first chamber, or elsewhere in the system, may be constructed of lead, or lead-lined iron, or earthenware. There is not much to choose between them, except that the material has to be selected according to the temperature of the gas. Earthenware fans are now made for large volumes of gas, and of such excellent construction that they compete for efficiency and smooth running with the best iron fans, but they must not be subjected to temperatures exceeding 100° C.

The Meyer tangential chambers are plain circular chambers, with an outlet for the gas at the bottom, a few inches up, so as to leave room for the acid to collect. The essential feature of these chambers is that the gases enter at the top tangentially, whereby they travel along the periphery in a downward spiral. This gives increased mechanical action, but the chamber must not have too large a diameter. These circular chambers are a

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*Notes from a paper in the *Journal of Chemical Industry*, Dec. 31, 1903, Volume XXII, pp. 1331-1336.

great success. A maximum of 11.6 cu. ft. of chamber space per pound of sulphur charged, with a maximum consumption of 2.7 of niter per 100 pounds of sulphur is now guaranteed. The Meyer chamber is not only rational, but also is the first and only distinct advance in construction of the lead chamber proper.

A further improvement in the working of the chamber is the introduction of atomized water instead of steam. The water abstracts heat liberated in the process, which is better than to add to the heat by the condensation of introduced steam. The use of atomized water has been perfected by Hartmann and Benker, who have tried it with great success in a number of plants. They introduce the water through the roof of the chamber by a number of special atomizers, which are adjusted so that drops of water will not be formed instead of a mist. Another atomizer is made by Koertings on the principal of their well known spraying nozzle. The increase of work done by atomized water in a chamber of certain size is very important. In one case the chambers worked at the rate of 8.25 cu. ft. per pound of sulphur. In a plant comprising two Meyer chambers, operated with fans and atomized water, and two plate towers, the first chamber alone has produced 10 kg. of H_2SO_4 per cubic meter, equivalent to 4.9 cu. ft. of chamber space per pound of sulphur. For ordinary chamber work, Niedenfuehr found a yield of 2.5 to 3.5 kg. of H_2SO_4 per cubic meter of the first chamber, and in the first plain tangential chamber at Harborg 4.5 kg., instead of the above 10 kg., when atomized water and fans are added to such a chamber.

For raising acid to the top of the towers, automatic elevators like those of Kestner or Plath, are in use, both of which work very well. The Frépont emulsifier also works well. This consists of a small lead cylinder into which leads an admission pipe for the acid, and a number of smaller pipes for the delivery. The delivery pipes, at a distance of about two feet from the cylinder, are surrounded by a jacket, into which compressed air is admitted; this mixes with the rising acid through upwardly slanting holes in the pipes, thus producing an emulsion of acid and air, which is lighter than a column of acid only. In this way acid can be pumped to heights according to the air pressure. With these emulsifiers all the complicated distributing apparatus on the top of the Gay-Lussac tower is done away with. The delivery pipe enters close to the top of the tower, and the mixture of air and acid strikes with great force against a baffle plate, thus producing a fine spray at a radius of more than three feet.

The results of the catalytic processes are not yet quite satisfactory. Trouble is experienced with the catalytic agents, in drying the air before it enters the kilns, in purification of the sulphur dioxide gas, and in absorption of the sulphur trioxide. The yield of acid is not so high as can be attained with the chamber process. With the latter it is nowadays not difficult to obtain a yield of 300 parts H_2SO_4 per 100 of sulphur burned, or about 98 per cent. of the theoretical. With the contact processes a yield of 96 to 98 per cent is claimed, but in at least two cases 90 per cent is hardly reached in practice. It is generally assumed that a contact plant will only pay when the daily output is to be at least 10 to 20 tons of H_2SO_4. The plant costs more than a modern chamber plant, but occupies somewhat less space.

In ordinary chamber plants with good Glover and Gay-Lussac towers, a consumption of 0.75 niter per 100 of H_2SO_4 is now frequently attained in America; the consumption is about 1.05 per 100 H_2SO_4; with Meyer chambers it is only 0.60. The production of acid for a given chamber space is with ordinary chambers now frequently 3 kg. of H_2SO_4 per cubic meter, but with the intensified working 4 kg. is attained. With atomized water and fans in ordinary chambers 5.84 kg. have been obtained. A set of Meyer's chambers without other improvements produced 4 kg.; according to Falding the later ones at Baltimore produced 4 to 4.8 kg., and according to Meyer's latest reports the production may even be up to 6.3 kg. With fans and atomized water, a Meyer set will probably reach 8 kg. and more.

Little improvement has been made in the concentration of sulphuric acid within the last few years. For concentrating ordinary acid to about 95 per cent, few systems can now compete with the Kessler or Benker plants. For stronger acid, up to 98 per cent, gold-coated platinum stills, or iron ones, are used. Perhaps Zanner's attempt to place earthenware-lined iron pans in the burning flues will bring about further economy, but for acid of 97 or 98 per cent, it is best to concentrate up to 93 per cent in a Kessler or Benker apparatus, and to let the acid run directly into an iron still, which then requires little fuel, and lasts much longer. The acid from the Kessler apparatus has just the right temperature to be fed into an evacuated iron still, and very little fuel is required to bring it up to 98 per cent, while the water and trace of acid evaporated would present no difficulty for their recovery.

In making a ton of H_2SO_4 at the rate of 20 tons per day, estimating a yield of 300 parts of acid per 100 of sulphur burned, the cost of manufacture with a modern plant comprising Meyer's chambers, atomized water, fans and good towers, which at the present time give the best results, will be approximately as follows: 13.605 tons of 50 per cent pyrites at 4.5d. per unit, 12s. 9d.; 0.16 ton of 72° Tw nitric acid at 10s., 1s. 7.25d.; 2.8 tons of coal at 7s., 11.75d.; labor, 2s. 10d.; repairs and renewals, 2s.; amortization (10 per cent on plant, 5 per cent on buildings, total £15,000) 3s. 1.75d.; general expenses, rent, taxes, etc., 2s. 10.25d., total, £1, 6s. 2d. The cost per ton of acid concentrated to 94.5 per cent, H_2SO_4 by Kessler's apparatus will be £1 9s. 7d. The cost per ton of acid containing 98 per cent H_2SO_4 concentrated in Kessler's apparatus, combined with iron stills will be £1 13s. 1d. The cost per ton of acid containing 98 per cent H_2SO_4 concentrated in gilt platinum apparatus will be £1 13s. 3d. The cost per ton of acid containing 98 per cent H_2SO_4 produced by the contact process at the rate of 20 tons per day, will be £1 19s. 7d., estimating a yield of 90 per cent from the sulphur burned, or £1 18s. 6d., estimating a yield of 98 per cent, these figures not including the royalty which is sometimes charged as an extra. It appears, therefore, that at present it is quite possible to make acid of 98 per cent H_2SO_4 in a modern chamber plant at 5s. 5d. per ton less than in a contact plant, even when no royalty be paid on the latter, and when the best yield is assumed. If, however, due regard be given to the proper return for the money invested, then it will be found that only 5 per cent interest increases the cost in the case of a chamber plant (£17,500) by 2s. 5d. per ton, while in the case of a contact plant the increase (on £43,000) amounts to 6s. per ton, so that the real difference amounts to 9s. per ton, or about 27 per cent in favor of the chamber plant. For certain manufactures, however, sulphuric anhydride, or a mixture with sulphuric acid, is indispensable either for direct use or for the purpose of revivifying used acids. Such factories will always require a contact plant, and will get the anhydride very cheaply.

COPPER DEPOSITS IN THE ENCAMPMENT DISTRICT, WYOMING.

A description of the geology and copper deposits of the Encampment district, Wyoming, by Arthur C. Spencer is listed as Professional Paper No. 25 of the United States Geological Survey publications. The region investigated includes about 450 square miles across the north end of Park Range, locally called the Sierra Madre, and in it are the town of Encampment and the settlements at Battle, Rambler, Copperton, Dillon and Rudefeha. Encampment, or Grand Encampment, as it was originally called, the distributing point, is situated 43 miles by wagon road from Walcott, Wyoming, which is on the Union Pacific Railroad. Though elevations range between 7,000 and 11,000 ft., the slopes are gradual, and roads may be constructed at comparatively slight cost.

The report gives the results of the first detailed study undertaken by the Survey of the pre-Cambrian rocks in the Rocky Mountain region south of Montana. Three sedimentary formations and an older series of volcanic flows are found closely folded together and intimately intruded by dark-colored igneous rocks locally known as diorite. Large amounts of granite and quartz-diorite also occur, but seldom contain indications of ore. The best ore deposits have been found in the quartzites, where the copper minerals form a cement in brecciated zones, but there are also fissure veins, igneous dikes containing infiltrated sulphides, impregnations near igneous contacts, and metamorphic zones in hornblende schists that are marked by calcareous silicate minerals carrying chalcopyrite and magnetite. The dark intrusive rocks are regarded as the source of most of the copper in the ore segregations, and its concentration in veins and ore bodies is attributed to circulating waters. Copper is the predominant metal of value, although a few occurrences of silver-lead ores have been noted, and gold is found either by itself in quartz veins, or in small amounts accompanying other metals. Valuable coal deposits exist and are worked for use at the mines and in the smelter situated at Encampment. Thus far no paying gold veins have been discovered. The Ferris-Haggerty mine, formerly known as the Rudefeha, is the most important of the region. It has been producing high-grade ore since 1899, but still contains large ore reserves. A large part of the report is devoted to a description of mines and prospects.

'Diabase' is an eruptive rock, usually intrusive, and consists essentially of a crystalline aggregate of calcic plagioclase with pyroxene, frequently a little biotite, and usually olivine.

A HOME-MADE BOILER FEED WATER HEATER.

By Ernest Stein.

The heater illustrated herewith is constructed of 2-in. lumber. It consists of a heater proper, 8 ft. high by 4 ft. in diameter, provided with a float regulating the butterfly valve, supplying the heater with cold water from the water tank, an overflow, or safety (E) discharging an excess of water and a perforated false bottom supported by a ring of 2-in. stuff nailed to the inside of the heater, 35 in. above the bottom. This false bottom supports pieces of rock which fill the heater. The cold water entering through the perforated feed pipe (A) as a spray drips down over the rocks; exhaust steam from the engine through pipe (B) and from the boiler feed pump through (C) enters near the top, and exhausts through the pipe (F) which reaches to within 8 to 12 in. of the surface of the water. The water dripping over the rocks is heated and a large portion of the steam is condensed.

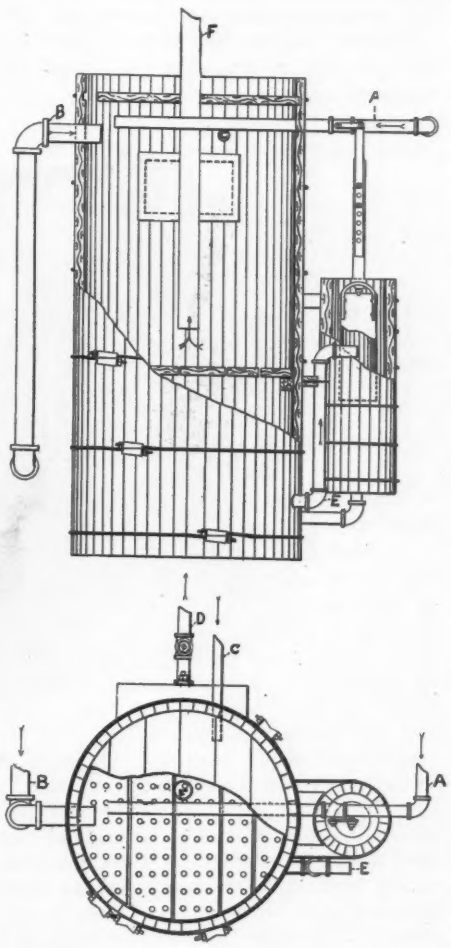
The feed pump, provided with hot water valves, and supplied by the pipe (D) is placed lower than the heater that the hot water may flow to it. The pieces of rock in the heater not only distribute the water, ensuring perfect heating, but also act as a partial water purifier, since a large part of any scale forming ingredients in the feed water is deposited on the rocks and not in the boiler. The heater is designed to heat the water by direct contact with the exhaust steam, condensing from 50 per cent to 75 per cent of the steam; where impure feed water must be used, this direct heating is advantageous, since the condensed water is pure and its use reduces the amount of scale formed in the boiler. The heater is provided wtih a manhole of sufficient size to admit a man entering to clean it. Usually the heater is cleaned monthly, the scale covered rocks being replaced by fresh ones.

The steam exhaust pipe from the engine is 3½ in., as is also the exhaust from the heater. All water connections are 2 in. Hoops for the heater proper are ⅝-in. round iron, provided with lugs. The float well has an inside diameter of 15 in. at the top, tapering to 16 in. at the bottom, and is tied by ½-in. round iron hoops made in one piece, slipped over the well and tightened like barrel hoops.

The heater shown was designed and constructed by Mr. C. Ballow, and at present is used at a 30-ton wet crushing lixiviation mill. It is a duplicate of several others in use at mills and mines in Guanacevi, being the third made from lumber, several other first-class heaters of practically the same design differing in the manner of introducing the exhaust steam.

The cost of this heater in Mexico complete with all necessary fittings is estimated at from $50 to $60, United States currency. Considering the saving in fuel and the longer life of grate bars, it might be supposed that few steam plants would be without a first-class heater, either one made at the works or one of the many sold by manufacturers; but instead cold water is pumped into boilers at a large number of mines and mills, causing more or less annoyance, delay and expense, and at times priming with damage to the engines. Roughly speaking, a good boiler feed water heater effects a saving of from 25 per cent to 40 per cent in fuel, depending on the temperature of water, capacity of boiler and size of heater.

The writer has known of cold water being pumped into boilers using green wood as fuel and furnishing steam for a 15-stamp dry crushing lixiviation mill and a compressor. As a result from five to 10 of the stamps were hung up. The fuel consumption being greater than was good for the company or the boilers, and no iron from which an iron heater could be constructed being obtainable on short notice, one of the men suggested the construction of a wooden heater, but the superintendent said that such a heater could not be made to fill the bill. Finally after running about eight months the mill closed and has not started since. Preliminary heating of the feed water would have resulted in a saving of from 3 to 4 cords of



wood per day, which alone, not considering the time lost by the mill, with wood costing about $2.50, United States currency, per cord, amounted to an item of several hundred dollars per month.

Granite is from the Italian *granito,* itself derived from the Latin *granum,* a grain. The granular appearance of the rock gave it this name. Typical granite has three constituent minerals, quartz, mica and feldspar.

By metasomatic exchange is meant an interchange of substance without necessarily involving, as pseudomorphs do, the preservation of the original form of the substance replaced, or even its original volume.

Pseudomorph and pseudomorphic are from the Greek *pseudes,* meaning false; and *morphe,* form. It describes a mineral which has taken on the crystalline form of another mineral.

A NEVADA COAL-FIELD.

By W. J. Stoneham.

At the north end of the Silver Peak range in Esmeralda county, Nevada, about 25 miles southeast of the old silver camp of Candelaria and about 1 mile from Coaldale, a station on the railroad from Rhodes Marsh to Tonopah, is a coal-field that was discovered by William Grozenger, of Candelaria, in 1893. Four principal seams have been found running in a northwest and southeast direction, the outcrops having been traced for over 5,000 ft. The seams occur in Tertiary lake bed deposits, a series of sandstones and shales which terminate on the south end at a steep cliff of volcanic rock about 2,000 ft. high, classified by Mr. J. E. Spurr* as rhyolite, probably of Tertiary age. The sediments appear to be exposed through a northeast-southwest fault. Near the fault line the sedimentary strata are somewhat contorted and broken with a general dip of about 15 deg. to northwest while two miles distant they are almost flat. In places in the coal measures are porphyritic rocks and some basalt, indicating volcanic activity; apparently these intrusive rocks are later than the displacement along the fault line.

It seems probable that the coal shales extend to the northwest under Columbus marsh and their area, greater than indicated on the surface, is fully 10 miles north and south by three miles east and west. The principal seams are locally known as Nos. 1, 2, 3, 4, the perpendicular distance between 1 and 2 seam being 135 ft.; between 2 and 3, 71 ft.; between 3 and 4, 42 ft. No. 1 seam is so thin and poor that it is regarded as not worth prospecting. No. 2 seam, in coal shale, is from 3 to 4 ft. thick, the coal being broken by bands of shale and of volcanic tuff. No. 3 seam, also in shale, is from 5 ft. to 6 ft. thick and of better quality than No. 2. No. 4 seam is 11 ft. thick on the surface and has a shale top and a sandstone bottom, the coal being far superior to that in the upper seams.

The work done on the discovery locations, consisting of shallow incline shafts, is near the fault line and the beds exposed are badly twisted, the coal in seam 4 being broken and overturned against the fault.

A sample taken by Mr. Spurr showed

Moisture	0.94	per cent.
Volatile matter	37.35	" "
Fixed carbon	42.63	" "
Ash	19.08	" "
	100.00	Coke good.

This analysis was made after the sample had been exposed to the air about six months. The important fact that the coal does not slack on exposure was thus determined.

On the Elder-Morgan locations the same seams have been prospected, the deepest incline being down 160 ft. on seam 3, which has a dip of 30 deg. At the outcrop this vein is very dirty, containing little or no coal, but within 75 ft. good coal is found on the roof and continues to the bottom of the incline, improving in width and quality. For the lowest 85 ft. the coal averages 3 ft. thick, and is clean, compact, and glossy. An analysis of coal from this seam near the surface made by Thomas Price, of San Francisco, showed

Moisture	1.81	per cent.
Volatile matter	34.52	" "
Fixed carbon	44.58	" "
Ash	19.09	" "
	100.00	" "
Sulphur	3.62	" "

The coal forms a hard coke. At surface

*Bulletin, 225; U. S. Geological Survey; "Coal Deposits of Esmeralda County, Nevada."

the seam showed over 28 per cent ash, so that at greater depth it may contain less than 19 per cent.

The other locations on which development work has been done are the Snook, Frantz and Petty lands, on which a slope has been sunk at an angle of 45 per cent to a depth of 154 ft. The seam is 18 ft. thick, but has bands of volcanic tuff, slate and bony. An analysis of a picked piece of the coal is reported to have shown 48 per cent fixed carbon and 11 per cent ash. The sinking of this slope is still proceeding.

The properties of W. Grozinger were at one time under bond to the Tonopah Mining Company, and some shallow prospecting was done, but owing to the broken formation and high percentage of ash the bond was not taken up. Since then the work done on the Elder-Morgan lands indicates that there the formation is more regular and less disturbed, and the coal seams better defined.

Mr. Spurr calls this a light bituminous coal, somewhat poorer than Colorado bituminous coal and, except for the high per cent of ash, comparable with some Pennsylvania coals. It is a fairly good steaming coal and an excellent gas coal. Mr. Charles D. Walcott, director of the U. S. Geological Survey, who paid a hurried visit to the fields in 1896, expressed the opinion that the coal strata corresponded to the Laramie series of Wyoming.

The commercial value of these deposits in a region where fuel is scarce is worthy of consideration. The high per cent of ash, attributable to sand and silt washed into the beds during and immediately subsequent to deposition, does not seriously interfere with the burning qualities. The coal is a good domestic and forge coal and has been freely used for these purposes for three years in Candelaria. It yields a firm steel colored coke. The potentialities of the fields justify prospecting at depth by the diamond drill. The present developments at Tonopah, Goldsfield, Lone Mountain, Reveille and other nearby camps point to an extensive output of heavy sulphide gold and silver ores, as well as silver, lead and copper ores. These are now shipped to Salt Lake and San Francisco, but the amount now in sight is sufficient to justify the erection of a coal smelter, while the demand for coal for domestic, railroad and mine purposes in these camps will also be considerable. The cost of wood now averages $11 per cord and Utah coal costs the Tonopah railroad $7.75 per ton. Another use would be for generating electricity for power and light, there being no water power available within a dstance of 80 miles.

By 'meta-diabase' is meant a diabase which has undergone mineralogical change, although its original character is not wholly obliterated.

The first steel ingot cast in the electric furnace at Gysinge, Sweden, on March 18, 1900, necessitated the expenditure of 6.9 kw.-hours per kilogram of steel. Eight months later this energy was reduced to 2.15 kw.-hours per kg., and in May, 1902, when the new plant was completed, to 0.96 kw.-hours per kilogram of steel. The output of the new plant is 4,100 kg. of steel per 24 hours. The steel is of good quality, unusually homogeneous, dense, tough, easy to work, and less disposed to crack and warp in handling than metal made by ordinary processes.

A HIGH-SPEED MOTOR-DRIVEN PUMP.

The operation of mine pumping machinery by electric motors has many obvious advantages, such as the centralization of the power plant, elasticity of extension of the system, high efficiency and small first cost and small expense for attendance. Compressed air may be used for the distribution of power to pumps, but has the disadvantages of the low efficiency of the plant as a whole. Small leaks, if many, become serious and the long line of piping with numerous joints may cause trouble and expense. The use of steam for driving pumps at a distance is objectionable on account of the loss by condensation, the heat from the engines and pipes, the expensive piping and the possible leakage from numerous joints.

Electric-driven pumps, however, have had one drawback, which, while not serious, had nevertheless, to be taken into account. This was the necessity of toothed gearing, belts or other devices to transfer the power from the rapidly revolving motor shaft to the slow moving crank-shaft of the pump. Such devices added to the weight and size of the pumping unit and required either careful attention or frequent repairs.

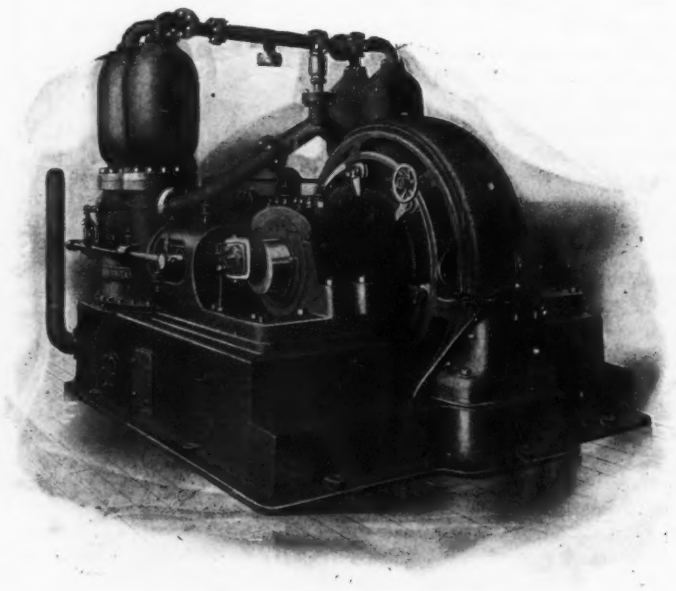
In the pump illustrated herewith these objectionable features have been eliminated by connecting the pump plungers to cranks mounted directly upon the shaft of the motor. This pump has a capacity of about 250 gal. per minute, against 1,000 ft. head when running at a speed of about 300 revolutions. The pump is of the duplex type; the cranks at the opposite ends of the motor-shaft being set at right angles to each other. The plungers are of the outside-packed pattern and the two plungers of each pump are connected by side rods. The plungers are 3½ in. in diameter and have a stroke of 5½ in. The pump has shown an efficiency of 93 per cent, approximating closely that of the highest types of large steam pumping engines. In this test the volume of water pumped was measured by a carefully calibrated Freeman nozzle and all gauges were tested before and after the test by a weight gauge tester. The pressure at the nozzle was measured by a mercury column connected to a piezometer chamber. Under the greatest pressure the pump showed a remarkably high volumetric efficiency. It worked practically noiselessly under all conditions without shock or heating.

The pump had 3½-in. plungers, 5½-in. stroke, direct-connected to a General Electric, 100-h.p., six-pole, 200-volt shunt motor. The test gave these results:

Revolutions per minute.	Motor input watts.	—Pump— Gal. delivered.	Pressure. lb.	Pump H.P.
280	28,800	237	110	32.63
280	40,600	237	215	48.94
280	52,550	235	321	62.25
280	60,200	234	425	74.53
309	58,800	232	496	71.79

Efficiencies.

Motor pump.	Motor alone.	Pump alone.
78 per cent.	86.5 per cent.	90.1 per cent.
82.2 per cent.	89 per cent.	92.36 per cent.
84.4 per cent.	90.1 per cent.	93.66 per cent.
84.3 per cent.	90.9 per cent.	92.74 per cent.
83.3 per cent.	.....	.....



BLAKE-KNOWLES HIGH SPEED PUMP.

The pump and motor are mounted upon a rigid box-girder frame and the unit is self-contained and occupies a relatively small space. tion and the most careful attention has been given to the design of the internal parts, as well as to the running parts and oiling devices.

This type of pump, which has only lately been introduced, has the advantages of simplicity of construction, small space requirements, cheapness of installation and attendance. It is built in capacities of from 200 to 4,000 gal. per minute, and for heads varying from 100 to 2,000 ft., by the Blake & Knowles Steam Pump Works, 114 Liberty street, New York City.

IRON MINING IN SOUTH RUSSIA.—Owing to the depression in the Russian iron industry, the miners in the Krivoi Rog district are turning their attention to the foreign ore markets. In 1903 the exports from the district amounted to 290,000 tons. About one-half of the exports was shipped by rail to Silesia, while the remainder was forwarded through the port of Nicolaieff to various countries. It is reported that the company operating the Kertch deposits has been compelled to renounce its concession which is now offered for sale.

RECENT LITERATURE OF ECONOMIC GEOLOGY. XVIII. LEAD AND ZINC.

By H. FOSTER BAIN.

Filones de Galena de Linares (España), by Paul F. Chalon. *Revista Minera,* Jan. 1, 8, 16, 24, Feb. 1 and 16, 1904.

The present condition of mining in this famous district, the mode of occurrence and genesis of the ores, and the methods of exploitation are discussed. From Linares comes about 10 per cent of the world's output of lead, an amount about equal to the output of the Cœur d'Alene. The galena occurs in veins cutting Cambrian (or pre-Cambrian) and Silurian slates, quartzites and graywacke, and along the contact between Triassic sandstone and certain granites and granulites, apparently intrusive though not clearly so stated. The veins are also well developed in the igneous rock itself. The galena is quite pure though altered to a carbonate at the surface and accompanied by increasing amounts of iron and copper sulphides in depth. Blende does not seem important at depths yet reached, which is less than 500 ft. in the mines particularly described. The ores are considered to be the result of gaseous emanations of Tertiary age, though the argument on this point is not wholly convincing. The mines are all small. Out of the 1,200 to 1,300 in the district 300 were in operation in 1903. Sr. Chalon's paper is illustrated by a small geologic map, and is supplementary to the fuller discussion published by Sr. Mesa in the *Revista Minera* in 1889 and 1890.

Lead and Zinc Deposits in Illinois. By H. Foster Bain. *Bulletin 225,* United States Geological Survey, pp. 202-207.

The deposits of zinc and lead found in the southern portion of the State in connection with the fluorspar veins are considered unlikely to be of any commercial importance. Those in the northwestern corner of the State, near Galena, are thought likely to show a growing production. They lie in an extension of the Wisconsin or Upper Mississippi lead and zinc district, which has been many times described. The ore occurs in the Galena limestone along crevices and in flats and pitches. So far the production from Illinois has been mainly of lead ore from the openings along the crevices. Persistent efforts are now being made to develop the zinc ores believed to occur in the lower lying flats and pitches. These efforts are meeting with some success, and the field, which includes some 150 square miles of territory, is commended to prospecting and development companies.

Lead Ore in Burnet County, Texas. By Wm. B. Phillips. ENGINEERING AND MINING JOURNAL, March 3, 1904, p. 364.

This directs attention to an undeveloped district believed to be worthy of exploitation.

The Wisconsin Zinc Fields. By Frank Nicholson. ENGINEERING AND MINING JOURNAL, December 5, 1903, pp. 847-849.

A general statement of the geology and development of the field is given and illustrated by maps and sections of ore bodies.

Galena in Louisiana. By A. C. Veach. Geological Survey, Louisiana, *Report,* 1899, p. 225; *Report,* 1902, p. 98.

In connection with a description of the salt deposits a very interesting occurrence of galena, which possibly throws some light upon the genesis of lead ores, is noted. From a shaft on Belle Isle at depths between 63 and 68 ft., considerable quantities of galena associated with smaller amounts of pyrite, sphalerite and chalcopyrite were taken. The crystals were sharp angled and showed no signs of erosion. The minerals occur disseminated through a blue clay and seem to represent original deposition from sea water. The galena carried no silver.

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

Mines and Quarries: General Report and Statistics for 1902. Part IV. Colonial and Foreign Statistics. Edited by Sir Clement Le Neve Foster. London, 1904; printed for His Majesty's Stationery Office. Pages, 493.

Seventh Census of Western Australia. Vol. I. Superintendent's Report. Compiled under the direction of Malcolm A. C. Fraser. Perth, 1904; Government Printer. Pages, 267; with map.

Jahrbuch der Elektrochemie. Vol. IX; for the year 1902. By Heinrich Danneel. Halle, A. S., 1904; Wilhelm Knapp. Pages, 750; illustrated. Price (in New York) $8.

Thirteenth Annual Report of the Mining Department of Tennessee. 1903. R. A. Shiflett, Chief Mine Inspector. Nashville, Tenn, 1904; State Printer. Pages, 193.

BOOKS REVIEWED.

The State of Wyoming. Edited and published by Fenimore Chatterton, Secretary of State for Wyoming. Pages, 144; illustrated.

A pamphlet describing the natural resources of Wyoming, with information regarding its physical features, climate, political divisions, population and other matters of general interest. The chapters describing the mineral resources have been prepared by H. C. Beeler, the State geologist, and are replete with data relating to the occurrence, distribution and production of the various metals and minerals occurring within the State. The publication has been issued under the stamp of official authority, and the information it contains can thus be accepted as trustworthy.

Free-Hand Lettering.. By Victor T. Wilson. New York, 1903; John Wiley & Sons. London; Chapman & Hall, Ltd. Pages, 105; with 23 full page plates. Price, $1.

This is intended to serve as a manual for students in engineering schools and colleges who desire to familiarize themselves with the technique of plain lettering. The author has endeavored to treat the subject in a suggestive way, with the object of fitting the student for independent and creative work. As indicating the scope of the book, we give the list of subjects discussed in the various chapters: The Construction of Roman and Gothic Letters; Spacing; The Use of the Pen and Offhand Lettering; Design of Lines and of Titles; Lettering for Various Technical Purposes, Including Photo-Reproduction; The Design of Lettering; Mechanical Aids to Lettering.

State of Tennessee. Nineteenth Annual Report of the Mining Department. Nashville, 1904; published under the direction of R. A. Shiflett, Chief Mine Inspector. Pages, 193.

This report describes the progress of the mining industry of Tennessee during the year 1903. It includes the statistics of production for that year, as well as the figures relating to 1901 and 1902, which have not been previously published, and supplements this information with brief notes relating to labor, accidents, and recent developments in the mines of the State. The publication of the report at so early a date shows commendable energy and will greatly enhance its value to the mining industry. In summarizing the developments the report states that the past year has been the most prosperous ever recorded, the production of minerals in most cases showing important increases with little or no change in average values.

Society for the Promotion of Engineering Education. Proceedings of the Eleventh Annual Meeting. Edited by Calvin M. Woodward, C. Frank Allen and Clarence A. Waldo. New York, 1903; Engineering News Publishing Company. Pages, 379 .

This volume, the eleventh of the series, is a record of the last annual meeting of the Society for the Promotion of Engineering Education held at Niagara Falls, New York. It contains the usual information relating to the constitution, membership and officials of the society, together with the minutes of the last meeting and the full text of the papers that were presented. Judging by the list of subjects which came up for discussion the meeting was a profitable one, and will doubtless have an important influence in promoting the objects of the society.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

A Story From Arizona.

The Editor:

Sir.—The following is a narrative that the writer overheard in making acquaintance with a typical cattleman from Texas, who found himself among a group of mining men in southern Sonora, Mexico, and naturally wished to contribute his quota to the discussion. It is so typical of the cattleman and prospector combined, that it is worth the reciting.

"In my young days I goes to Globe City, Arizona, and while there, I strikes a prospector of name, Bill Pump. He give me invitation to go on Salt River a'prospecting with 'im. We starts out on the 22d day of December, 1888, landed at mouth of Cherry Creek the next day and goes along prospecting a couple of days, followin' up the creek. Me being a tenderfoot and a young man in the business, I asks him the minerology of all the rocks, and there was any quantity of 'em, too.

The second day, after a hard day's prospectin', all tired out, a-walkin' over the rocks up the creeks and over the trails, and after showing him two or three hundred different kind of rocks, I asks Bill Pump the indications of a certain kind of little black river rock with holes in 'em (you know the sort I mean). He says to me: "Say, Texas, the indications of this rock is starvation, goes two thousand pounds to the ton pure rock." I quit Mr. Pump with a thoro' knowledge that I knowed nothin' whatever of prospectin' and

gets back to punching cows at $60 a month. I left Tonto Basin June 20, '89, and landed in Phoenix, Arizona, on the 1st day of July.

I hadn't been in town long when I meets with Mr. Pump, he bein' very excited and tellin' me of how he found a prospect in the Harquijuila country and how he had just done sellin' the prospect for $2,400. We bein' old pals, Mr. Pump proceeded to show me the town and a time, sayin', 'Tom, you are a —— fool, how much have you earned?' Me replyin', 'About $300.' He says, 'Tom, if you had went with me, you see, I have sold out for $2,400, and half would have been your'n. We proceeded to take in the Fourth of July and did pretty well for a few days, Bill Pump not allowin' me to pay for nothin,' and when we parted, Mr. Pump had about $7.75 and I had less than that." F. R.

Denver, June 12, 1904.

ABSTRACTS OF OFFICIAL REPORTS.

Briseis Tin Mines, Ltd.

The report of the Briseis Tin Mines, Ltd., a company working deposits of alluvial tin near Derby, Tasmania, is for the calendar year 1903. A summary of the principal results obtained during this period shows that a total of 256,940 cu. yd. of ground was sluiced for an output of 412 tons black tin containing 301 tons of metal. The sales of ore for the year realized £37,427, or £124 18s. per ton on a total of 299.5 tons. In addition the company received £2,594 in payments by the New Brothers Home No. 1 Company, with which it has a working arrangement, and sundry amounts from other sources, giving a total income of £40,081. The expenditures at the mine amounted to £34,596, the London expenditures were £2,833, and a further sum of £2,407 was written off for development, so that the net balance carried forward was £245.

The general manager's report states that the work for the year consisted in the removal of the overburden on Briseis hill, including the property of the New Brothers Home Company, and the winning of tin for revenue purposes, with the necessary removal of overburden for this purpose at the southern end of the mine. A certain amount of general construction in prospecting was done during the earlier part of the year. The total quantity of overburden removed was 482,377 cu. yd., divided as follows: Briseis company, 272,910 cu. yd.; New Brothers Home Company, 77,827 cu. yd.; southern workings, 131,640 cu. yd. The average cost of stripping the overburden during the last 6 months of the year was 6.18d. per cu. yd., while the cost of sluicing the drift was 6.52d. per cubic yard.

The overburden that is being removed from the northern face of Briseis hill is from 200 to 250 ft. wide. On completion of this work about 120 ft. in width of uncovered drift will be available for sluicing, the remainder being occupied by the tailraces, tramways, pipe line, etc., necessary to continue the removal of the hill. At the end of the year there remained approximately 320,000 cu. yd. to complete this strip, which is as nearly as possible equally divided between the Briseis and New Brothers Home companies. The rate of removal during the past six months has been from 30,000 to 38,000 cu. yd per month. It would indicate that the first strip across the hill should be completed in about nine months.

So far as can be determined at present, the proportion of overburden to drift in February, 1903, was two-thirds of a cubic yard of the former, to one cubic yard of the latter. This proportion, however, varies at different points along the lead. Each cubic yard of drift, besides having to pay for its own treatment, will have to be debited with the cost of excavating two-thirds of a cubic yard of overburden, that is 4.12d., or about the value of one-half pound of black tin.

The year's operations have not given any further information in forming a reliable estimate as to the value of the remaining drifts. It is probable, however, from the configuration of the surface at the upper end of the lead, that the value of the drift here will be at least equal to that of the Briseis from which so much tin has been won in the past.

Cape Copper Company, Ltd.

This company owns copper mines in Cape Colony and at Tilt cove, in Newfoundland; also reduction works at Britonferry, in England. The report covers the year ending August 31, 1903.

The directors' report says: "The profit and loss account shows a credit balance of £101,585, including £5,606 brought from the previous year. This has been dealt with as follows: £10,094 has been paid in income tax and $22,313 in dividends, leaving a balance of £69,178 to be carried forward, out of which a final dividend of 1s. 9d. per share on the preference shares and of 4s. per share on the ordinary shares was paid January 1, 1904. In accordance with the terms for the issue of preference shares, the holders of the ordinary shares are entitled to, and will receive, 2s. 3d. per share in excess of that paid to the preference holders, that being the amount per share paid to the latter last year, when no dividend was paid on the ordinary shares.

"While the result of the Boer raid did not materially affect the return from the Ookiep mine, it was not until February last that the work of restoration was sufficiently completed to enable smelting operations to be resumed at Nababeep. The year under review has, therefore, only benefited by the output for 2.5 months from the latter mine. The directors regret that the government has not, to the date of this report, settled the claims for compensation for damage done to the company's property during the war. The heavy loss on the stocks of furnace materials at the smelting works, referred to in the last annual report, has fortunately not recurred, and by an altered method of valuation the possibility of a repetition of losses on stocks has been removed. A slightly improved value has been obtained for the company's produce during the year.

"In South Africa, the returns from the Ookiep mine during the 12 months were 18,009 net dry tons. In addition to this quantity, 549 net dry tons of slimes, assaying about 11 per cent dry assay, have been shipped, and brought into the year's account. There remains at surface an estimated quantity of 3,800 tons of this material. The visible underground reserves are estimated at 9,772 tons of 21 per cent, compared with 9,024 tons of the same percentage at the close of the previous year. The stopes in the upper levels have yielded satisfactorily during the year; but, notwithstanding the considerable amount of exploratory work, nothing of any value has been discovered in the lower levels of the mine, which have therefore been discontinued.

"The returns from the Nababeep mine were 6,121 gross tons of 6.96 per cent wet assay. Of this quantity, 5,788 tons were treated at the local smelting works and 333 tons at the Ookiep smelting works. The visible reserves of ore on April 30 last were estimated at 210,000 tons of 5 per cent net dry assay, as compared with 195,000 tons of a similar assay at the end of the previous year. The new shaft has been deepened from 88 to 100 fathoms, and levels driven at depths of 90 and 100 fathoms. The work of development and exploration has been vigorously carried on during the year, and favorable ground has been opened up for stoping, notably at the 74 fathom level.

"Work at the Nababeep old mine has been re-started. Narrap was re-opened at the end of December last, after the erection of the hoisting engine, replacing the one destroyed by the Boers. The shaft has been extended to a depth of 55 fathoms. Operations at Koperberg and Carolusberg have been resumed during the year. The ground at both places has at times presented a favorable appearance, but nothing of importance has, so far, been revealed.

"At Tilt cove, in Newfoundland, the output from the East mine was 45,606 tons of 3.45 per cent wet assay, and the reserves are estimated at 110,063 tons. The South lode has, during the year, produced 16,627 tons of ore, assaying 3.75 per cent wet assay, and there are estimated to be 40,000 tons in reserve. It is gratifying to note that at this lode the ore continues to extend in a westerly direction, and also holds down in the No. 4 stope. The North lode has produced 4,884 tons of ore of 3.28 per cent wet assay, and 3,388 tons are estimated to be in reserve. The output from the West lode was 1,063 tons of 2.63 per cent wet assay. This has so far proved to be only a small pocket of ore. A new adit tunnel is being driven to connect with the East mine, and when this is completed a driving will be made under the West lode, to ascertain if it makes in depth. When the new adit tunnel has been completed, all pumping charges at the East mine will cease.

"In South Africa, all the machinery and plant destroyed during the war at Narrap and Nababeep has been replaced, and the engines and machinery at Ookiep and the other stations have been kept in good repair. On the railway, the bridges, culverts, water tanks, permanent way, etc., damaged during the siege of Ookiep, have been restored, and nearly 10 miles of the permanent way were renewed with rails of 50-lb. section, chiefly on the mountainous portion of the line. The amount carried during the year shows a net decrease of 3,368 tons, compared with the previous year, occasioned chiefly by the stoppage of the Nababeep smelting works and a lessened quantity of goods forwarded for the public.

"The smelting operations at Britonferry proceeded very satisfactorily. Some economy has resulted from the installation of the electrical power plant, though less than had been expected, but with the further improvements which are now being effected a considerable increase in the savings is anticipated

"Smelting was re-started at Ookiep at the end of May, 1902, and proceeded favorably throughout the remainder of the year. The extensive damage to the machinery and plant at the Nababeep smelting works was repaired by February 11 last, and since that date the work has proceeded satisfactorily. A fourth furnace is being erected, which will enable an increased quantity to be smelted.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Gypsum.—As I am about to open up quite a large silver mine on which there is also a very large deposit of pure gypsum, I would consider it a favor if you cold tell me what American firms will buy this mineral.—B. R. C.

Answer.—Unfortunately the commercial value of your deposit of gypsum is impaired by the high ocean freight rate to the United States—a country that consumes annually nearly 1,000,000 tons in the shape of plaster, etc. This country imports about one-third of what it uses, the balance being obtained from domestic mines, principally in the Central West. The imports are nearly all from Nova Scotia, and although they pay a duty of 50c per ton on crude gypsum, and $2.25 per ton on calcined or ground, low ocean freight rates to Eastern markets permit of keen competition with the domestic product. The trade in the United States is controlled by comparatively few people, and at least one large firm represents about 35 different producers. Messrs. Hammill & Gillespie, 240 Front street, New York, are importers of minerals.

Graphite.—We find that you quote in your price-current for minerals, etc., different qualities of graphite, and as we have just acquired an immense tract of land on which we have discovered some very large deposits of graphite, we shall esteem it a favor if you would kindly give us some information on the subject. We are anxious to obtain a plant to treat this ore. As these deposits are all in the interior and far from the railway, all machinery has to be carried on mule-back, therefore no package should exceed 60 kg. gross. The rollers for crushing can be sent entire, as we can arrange to have them transported on bullock-carts. To commence with we would like a machine to treat say from 4 to 5 tons of mineral in 12 hours.—A. & R.

Answer.—The samples of graphite submitted by you are of pretty good quality, and if properly treated to remove the impurities such as quartz, mica, etc., would find a market at satisfactory prices. The method in vogue is to crush, screen and concentrate the crude graphite as mined, and then to grade it according to quality. For some special purposes finely powdered graphite is purified by mixing 14 parts of the washed mineral with 1 part of potassium chlorate and 2 parts of 66° sulphuric acid, heating on a water bath for some hours, and then washing again and roasting to a red heat. At Ticonderoga, New York, the largest consumer in this country, the Dixon Crucible Co., of Jersey City, N. J., makes use of the Hooper pneumatic concentrator. High grade Ceylon graphite (the standard on the market) analyzes from 98.817 to 99.792 per cent. carbon, 0.283 to 0.05 per cent ash and 0.90 to 0.158 per cent volatile matter. Dealers in graphite are the Pettit Chemical Co., 256 Front street, New York, and Ilsley, Doubleday Co., 229 Front street, New York.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

WHEN CONTRACT OF PURCHASE CANNOT BE RESCINDED.—An agreement for the purchase of mining claims stipulated, that, if adverse claims were established to any portion of the land embraced in the agreement, the price should be reduced pro rata. The purchaser at the time of securing the option knew that the title to portions of the land was in dispute. The seller claimed to own all the land included in the agreement, but some ground was subsequently decided to be the property of another. The agreement also made mistakes in the boundaries of certain lodes. It was held that the purchaser was not entitled to rescind the agreement.—Smith v. Detroit & D. Gold Mining Co. (97 *Northwestern Reporter,* 17), Supreme Court of South Dakota.

CONTRACT REGARDING RIGHTS TO BE INTERPRETED BY LEGAL LIMITATIONS.—A contract between the owner of a junior mining claim and the owner of a senior location which conflicted required the owner of the junior to convey, on the issuance of his patent, to the owner of the senior claim the 'surface ground' within the conflict, excepting the junior vein, whenever it crossed the conflicting surface. Under the law at that time the owner of the junior claim was, as to the territory in dispute, entitled only to the junior vein where it crossed the senior. The court held that the parties intended a conveyance of all minerals in the disputed territory, except the junior vein.—Bogart v. Amanda Consolidated Gold Mining Co. (74 *Pacific Reporter,* 882), Supreme Court of Colorado.

DUTY ON STEEL PLATES FOR BALL-MILLS.—Certain steel shapes—known as ball-mill plates—some flat and some curved, with slotted holes drilled through, Held to be dutiable as "plates and steel in all forms and shapes not specially provided for" under the provisions of paragraph 135, act of July 24, 1897, and not as "boiler or other plate iron or steel" under paragraph 126.—Appeal of F. L. Smidth & Co. from Collector of Customs at New York; Board of General Appraisers.

DUTY ON ALLOYS.—The merchandise in question, which was imported in the form of pigs, was of two kinds, invoiced, respectively, as "iron and manganese alloy" and "tin and copper alloy." Duty was assessed on the former under the provision in paragraph 172, tariff act of 1897, for "alloys of any kinds in which aluminum is the component material of chief value, in crude form," and on the latter under the provision in paragraph 173 for manufactures of metal. The evidence showed that the iron and manganese alloy was used for hardening bronze, and the copper and tin alloy was used in the manufacture of anti-friction bearings, etc.; also that the material had not been advanced in manufacture beyond the condition of metals unwrought, as that term is used in paragraph 183. *Held* that the so-called iron and manganese alloy was properly classified under paragraph 172, but that the tin and copper alloy should have been classified under paragraph 183, as claimed by the importer.—Appeal of Wm. Cramp & Sons Ship & Engine Building Company from Collector of Customs at Philadelphia; Board of General Appraisers.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

762,309. APPARATUS FOR WASHING GRANULAR MATERIALS.—George M. Hoffman, U. S. Army, and John T. Gibson, New York, N. Y. In combination, an immersion pit or well, a hopper or receptacle which forms an enlarged receiving-mouth for the said pit or well, air-lift apparatus for raising materials from the said well, and an annular valve for closing the top of the said immersion pit or well, said valve being separated by an annular space from the air-lift apparatus around which it is guided, for substantially the purposes set forth.

762,329. APPARATUS FOR AUTOMATICALLY GREASING HOISTING OR HAULING ROPES.—Peter Macadam, near Johannesburg, Transvaal. In an apparatus of the class described two pulleys between which the rope to be greased passes, flexible means passing around the pulleys and means for supplying the flexible means with grease, substantially as described.

762,352. EXCAVATING-MACHINE.—John L. Scanlan, Indianapolis, Ind. In an excavating-machine, the combination with a scoop or dipper, and a dipper-beam, of a revoluble mast inclined upwardly, a boom extending from said mast, said boom comprising two side guide members, horizontally-extending guides situated beneath and in vertical alinement with said upper guide members and between which said dipper-beam is adapted to work, a shaft mounted on said lower guides, a beam-guide pivoted on said shaft, a pinion and a rack on said dipper-beam whereby said dipper-beam is traversed in said beam-guide to elevate or lower said scoop, drag-ropes for dragging said scoop either forwardly from or rearwardly toward said revoluble mast.

762,416. SEPARATOR.—Robert W. Jessup, San Francisco, Cal., assignor to Spiral Belt Separator Co., San Francisco, Cal. A separator comprising an inclined rotable roller, a back-board, end partitions secured to said board and having faces conforming to and forming with the face of the uprising upper quadrant of said roller a close joint, brackets secured to said backboard and separated by a space from the partitions, a hood carried by said brackets conforming to the said quadrant of the roller and separated from its face to leave an intervening space for separating action, a feed-hopper leaving an entrance-passage extending through the backboard to deliver the material to the intervening space near the upper partition, a discharge-passage in the backboard from the intervening space near the lower partition and a stop secured to the backboard and traversing the base of said space, said stop inclining downwardly toward the face of the roller.

762,447. EXPLOSIVE AND METHOD OF MAKING SAME.—Everard Steele, Mill Valley, Cal. An explosive consisting of a mechanical mixture of nitrated phthalic acid and an oxidizing agent, substantially as described.

762,479. REINFORCED CONCRETE CONSTRUCTION. Henri Kampmann, Baltimore, Md. The combination in a structure of strengthened concrete, of longitudinal strengthening-rods, a transverse strengthening-rod disposed above said longitudinal rods, and a stirrup comprising a double base portion disposed beneath the longitudinal rods and arches connecting the parts of said double base portion and passing over said transverse rod.

762,495. PROCESS OF MANUFACTURING COAL-GAS.—Tom Settle and William A. Padfield, Exeter England. In the manufacture of illuminating-gas from coal in upright retorts, the mode of supplying the coal to such retorts which consists in introducing it in measured quantities toward the walls of the retort in such manner as to produce a cup-shaped layer of uncarbonized coal on the top of the gradually-increasing mass of incandescent material contained in the retort and to leave a space around the walls of the retort above said layer, as and for the purpose set forth.

762,568. GAS-PRODUCER.—Lida Wilson, Glasgow, Scotland. In combination in a gas-producer, a central compartment for the combustion of fuel, a heat

refractory lining surrounding the lower part thereof, a surrounding compartment, provided with a heat refractory lining, and forming an intervening space between such lining and the casing of the central compartment, a lateral exit for the gas from the said central compartment, intermediate of its height, communicating with said intervening space, a duplicate coil of pipes for the supply to the producer, of heated air, and of superheated water or steam arranged in said space surrounding the central compartment, and means connected to the top of the space between the compartments for taking off the gases, substantially as described.

762,578. REGENERATIVE GAS-FURNACE.—Eugene Derval, Paris, France. In a gas-furnace, an inclined retort composed of curved sections arranged to cause the inclination of the lower section to the horizontal to be less than that of the adjacent section above, substantially as described.

762,580. CRUSHING AND GRINDING MILL.—James M. Dyer, Douglas City, Cal. The combination in an ore crushing and pulverizing apparatus, of a cone revoluble upon a vertical axis and having a spherically-curved base-flange; a cylinder of larger interior diameter than the cone and having a spherically-curved base to fit the curvature of the cone-flange; an annulus surrounding the top of the cylinder, said cylinder and annulus having their adjacent faces provided with a raceway containing balls, said annulus having an outer curved surface; a plate concaved to fit the annulus and movable in a horizontal plane to tilt the upper end of the cylinder; a splash wall and screen surrounding the lower end of the cylinder; and an annular trough surrounding the screen.

762,596. APPARATUS FOR TEMPERING MOLDERS' SAND.—George W. Packer, Chicago, Ill.; Margaret A. Packer, administratrix of said George W. Packer, deceased. In an apparatus for tempering sand the combination of a hopper for receiving the sand, a plunger for engaging the sand in the hopper, having its forward end beveled on the upper side, a deflectable gate arranged adjacent to the forward end of said plunger in the line of movement of the sand, means for supplying moisture to the sand, and means for controlling said supply operatively connected with said gate, substantially as set forth.

762,608. BRICK-CUTTER.—Byron E. Bechtel, Waterloo, Canada. In combination, a frame having longitudinal upper tracks, longitudinal lower tracks, and curved vertically-arranged end tracks between the upper and lower tracks, an endless traveling table comprising plates hinged together and arranged end to end, each plate provided with a pair of supporting-wheels arranged at the side edges thereof and between and not projecting beyond the ends thereof, said wheels supporting the table on said upper and lower tracks and around said curved tracks, and a rotary cutting-reel having cutting-wires arranged to pass down between the ends of the plates.

762,628. APPARATUS FOR PROMOTING FLOW OF OIL AND GAS IN WELLS.—Fulton Gardner, Chicago, Ill., assignor of one-half to Julia B. Follette, Chicago, Ill.—An apparatus of the character described, comprising a plurality of heating-cartridges each consisting of an outer shell of refractory material, a filling of conducting material of high electrical resistance, electrodes arranged within said shell at separated points, a pair of main conductors extending to each of said cartridges, and electrical connections between the electrodes of each cartridge and said main leads whereby the series of cartridges are connected in multiple with the main leads.

762,650. DRILL-CHUCK.—Thomas E. O'Brien, Boston, Mass., assignor of three-eighths to Joseph F. Eaton, Boston, Mass. In a drill-chuck, an arbor whose forward end constitutes an abutment for the jaws, a threaded body fast on said arbor and formed with jaw-guiding grooves extending to the arbor from points on the periphery of said body back of the forward end of the arbor so as to expose said end within the chuck-body, radially-movable jaws mounted in said grooves and abutting said arbor end, and a threaded shell screwing on the body and having a wedging action on the jaws.

762,654. METHOD OF ANNEALING AND TEMPERING FORMS OF METAL.—Edward P. Reichhelm, Bayonne, N. J., assignor to American Gas Furnace Co., Elizabeth, N. J. The method herein specified of treating strips, bars or other forms of precious or semi-precious metals and preserving the bright polished surfaces thereof, for annealing and tempering the same, consisting in conveying said forms of metal along within and through a substantially closed chamber from which the atmosphere is excluded and subjecting the same in transit to the direct heat of air and gas flames, and thereafter cooling the same in the presence of the heated products of combustion and before said forms of metal are admitted to the presence of the atmosphere, substantially as set forth.

762,655. APPARATUS FOR TUNNEL CONSTRUCTION.—Jesse W. Reno, New York, N. Y. In a pile-driver, the combination with a hollow cylinder adapted to receive a pile, of a hydraulic piston adapted to operate in said cylinder and means for holding said cylinder in place.

762,696. MINE TRAP-DOOR AND OPERATING MECHANISM THEREFOR.—Alonzo T. Flint and Isaac Whitney, Oskaloosa, Iowa. In a mine-door, the combination with a pair of pivotal supports, of door-leaves carried by said supports, one of said door-leaves comprising a section rigidly secured to the support, and a section connected with said rigidly-attached section by means of spring-hinges, said rigidly-attached section being secured to the support intermediate of its edges and the other door-leaf being attached to its pivotal support by means of spring-hinges and comprising a single section only.

762,718. METHOD OF PRODUCING ARTIFICIAL FUEL.—George K. Hollister, Jr., New York, N. Y. The herein-described process of making an artificial fuel in blocks or briquettes, which consists in mixing anthracite culm or screenings and the like with a pulverulent bituminous coking coal, then adding a binding agent consisting of water, an alkali, whiting, resin, and alum, cooking all together, till thoroughly mixed, in a receptacle kept evenly heated at a high temperature, continuing the mixing till the water has almost evaporated, then molding the mass under high pressure into blocks, and finally exposing said blocks to air heated to a high temperature to remove the moisture from the blocks.

762,735. MANUFACTURE OF INSULATED OR COVERED WIRES AND MACHINE THEREFOR.—Charles Martin, Nottingham, England. In a magnetic separator, a separating-carrier having a transversely-laminated separating-surface, formed by a series of magnetizable laminæ having projecting edges which extend longitudinally of the carrier, in combination with means for magnetizing said carrier, substantially as described.

762,751. SEPARATING-CYLINDER FOR MAGNETIC SEPARATORS. Clarence Q. Payne, Stamford, Conn. In a magnetic separator, a transversely-laminated separating-carrier, provided with a plurality of magnetizable laminæ having edge projections, in combination with means for magnetizing said carrier, substantially as described.

762,752. APPARATUS FOR MAGNETIC SEPARATION.—Clarence Q. Payne, Stamford, Conn. In a magnetic separator, a separating-cylinder movable between two opposing pole-pieces, in combination with means for retaining the material in close proximity to the cylinder along a considerable segment of said cylinder below its horizontal diameter and within the magnetic field, substanially as described.

762,753. APPARATUS FOR MAGNETIC SEPARATION.—Clarence Q. Payne, Stamford, Conn. In a magnetic separator, a transversely-laminated separating-carrier provided with a plurality of contacting magnetizable laminæ whose outer edges are wholly out of contact with those of their adjacent laminæ, in combination with two opposing magnetic surfaces both placed external to said carrier and between which said carrier is arranged to travel, and means for feeding the material to be separated, substantially as described.

762,767. FLUID-PRESSURE REGULATOR.—James W. Scott, Colorado Springs, Colo. A fluid-pressure regulator having a diaphragm-casing, a diaphragm therein, a diaphragm-support for engagement by one side of the diaphragm, the outer end of the support being fulcrumed, and a ball-bearing for the inner end of the support, as set forth.

762,774. APPARATUS FOR THE CONCENTRATION OF MINERALS BY MEANS OF OIL.—James W. Van Meter and Martin P. Boss, San Francisco, Cal. An apparatus for concentrating minerals by means of oil, comprising a channel through which the oil flows, means for supplying pulp and water to the oil at the head of said channel, means in said channel at intervals for drawing off the settled gangue and water, means at the foot of said channel for separating the relatively upper and lower portions of the oil, and means for returning said separated upper portion of oil to the head of the channel.

762,775. SAND-CLEANING APPARATUS.—William S. Vanzant, Eldredge, N. J. A car divided horizontally into compartments, a longitudinally-disposed washing-tank in each compartment, each provided with a longitudinal shaft carrying agitator-blades, a framework upon the top of the car, carrying a rotating screen, a chute leading from the screen to the tank, a valved passage from the upper tank to the lower and from the lower tank to an elevator-hopper, and laterally-projecting conveyers delivering to the screen and from the elevator-hopper.

762,785. MECHANISM FOR GATHERING BULK CARGOES BENEATH HATCHES.—Charles H. Wellman and James E. A. Moore, Cleveland, Ohio, assignors, by mesne assignments, to the Wellman-Seaver-Morgan Co. In mechanism for gathering bulk cargo beneath a hatch, the combination of a structure mounted over the hatch, with a beam having a bracket pivotally mounted upon said structure so as to swing laterally, said beam extending down into the hold and being provided at its lower end with a hoe or scraper, substantially as specified.

762,859. PULVERIZING-ROLLS.—William C. Davis, Denver, Colo. In pulverizing-rools the combination with the swinging arms and tension-rod of a spindle journaled in the upper extremity of each arm and having an eccentric which the eye extremity of the arm engages, means for adjusting the spindle to throw the maximum point of eccentricity out of line with the longitudinal axis of the rod, a collar slidably mounted on each rod adjacent its eye extremity and engaging the swinging arm, a stop on the rod, and a spring interposed between the stop and the sliding collar.

762,863. COAL-DRILL. George F. Weiss, Springfield, Ill. In mechanism for driving coal-drills, the combination with a spiral drill-shaft having longitudinal grooves, of a sleeve having internal ribs to engage the grooves of the shaft, a sleeve having inclined wings to bear against the spiral surfaces of the shaft, gear-wheels on the sleeves, a counter-shaft parallel with the drill-shaft, a gear-pinion fixed on the drive-shaft in mesh with the wheel of one of the sleeves, such pinion having a clutch-face, a gear-pinion mounted slidably on the counter-shaft in mesh with the wheel of the other sleeve, clutch projections on the slidable pinion adapted to engage the clutch-face of the relatively fixed pinion, means for shifting the slidable pinion to throw it in and out of clutch and means for imparting rotary motion to the sleeve having the ribs, substantially as described.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy.

Week ending June 4, 1904.

11,873 of 1903. MINERAL WAGON DOOR ATTACHMENT.—A. E. Morgan, Birmingham. Method of actuating the sliding discharge doors of mineral wagons simultaneously, from the locomotive.

12,719 of 1903. MAKING ZINC OXIDE ELECTROLYTICALLY.—Syndicat de Dr. Oettli, Zurich. Making zinc oxide by electrolysis, by first producing zinc zinchydrate in an electrolytic bath of sulphate of soda with zinc electrodes, and then calcining.

14,749 of 1903. UTILIZING WASTE NITER CAKE.—G. E. Davis, Manchester. Utilizing waste niter cake, by digesting it with aluminous materials, so forming sulphate of alumina.

25,032 and 25,033 of 1903. ELECTRIC FURNACE.—R. S. Galbraith and W. Steuart, Auckland, New Zealand. Improved electric furnace for smelting iron sands and other refractory ores, the improvement being in continuously intermingling and mixing the charge instead of allowing it to gradually subside.

27,516 of 1903. COPPER-ALUMINUM ALLOYS.—A. Jacobsen, Hamburg. Improving copper-aluminum alloys by adding small amounts of an alloy containing about equal portions of zinc, copper, aluminum, and silicon, thus making the alloy more easily worked.

4,478 of 1904. MAKING FIRE-BRICK.—J. Bach, Riga, Russia. Making refractory fire-bricks by adding hydrate of alumina to silicate of alumina, so bringing up the alumina contests to over 90 per cent.

5,835 of 1904. ROCK-DRILL ATTACHMENT.—Société des Ateliers Burton, Nogent, France. An arrangement of cushioning springs to moderate the shock of the oscillations of rock-drills, and so prolonging the life of the mechanism of the drill.

SPECIAL CORRESPONDENCE.

San Francisco. June 15.

(From Our Special Correspondent.)

The longest voyage ever made by a vessel using oil alone for fuel was completed by the arrival here of the steamer Nebraskan from New York, a distance by log of 13,150 miles. The voyage occupied 52 days and 10 hours. Some heavy gales were encountered, but the oil burning appliances were never out of order. The furnaces consumed 9,634 bbl. of oil, the tanks hold 10,834 bbl., and the vessel had a cargo of 5,000 tons. In this connection it may be said that the State Mining Bureau will issue in about a month a bulletin on 'Production and Uses of California Petroleum,' by Paul W. Prutzman, in which are given full directions for use of fuel oil, precautions to prevent accidents with methods of firing, and results as compared with coal. It will be one of the largest bulletins ever issued by the Bureau.

A preliminary survey of the route for the proposed electric railway from Marysville, Yuba county, to Downieville, Sierra county, has been started. Water power has been secured on the Yuba river, near Downieville. The road will be of great benefit to Sierra county, where there are many idle claims. Sierra and Plumas counties, which adjoin, are mountainous and have many torrential streams, which can furnish water power. The Western Pacific will come through Plumas, and through Butte county, giving transportation facilities to a number of partly developed mining districts. Plumas and Sierra, have always been backward in development, owing to poor transportation facilities. The copper industries of Plumas are extensive, but almost wholly undeveloped. There are also as many gold mines as there are in Sierra.

In all the mountain counties 12 mule teams, traction engines, etc., are hauling in supplies to the different mining camps. The roads are just in decent condition after the winter rains. The supervisors in some of the counties are giving serious consideration to better roads, re-grading, oiling or macadamizing them. Generally speaking, the mountain county roads are muddy in winter and dusty in summer, so that teaming is annoying and expensive, increasing the cost of mine supplies and machinery.

The question of taxation of unproductive mining claims has always been troublesome, as has also the assessed valuation of producing claims. As the result of a dispute of this kind, it is reported that the Mariposa Land & Commercial Co., owning the famous Mariposa or Fremont grant in Mariposa county, threatens to cancel all mining leases. An instance is cited where 11 tons of ore were taken out by lessees, the ore running $11 per ton. The hole made was called a mine by the assessor, was assessed at $5,000, and the tax amounted to $130, or $9 more than the gross returns of the gold mined. This sort of assessing is detrimental to the mining industry. One reason why mining companies operated by private individuals are so secretive about output, is that they fear excessive taxation. Certain operators never will report figures of production to Government officials, for fear assessors may get at the returns, though neither the United States Mint nor the United States Geological Survey officials make public or show to any one the individual returns.

A foolish story was published by New York newspapers of a gigantic combination to control all the mines of this country, including: "Extensive placer gold interests in Southern California controlled by Southern California banks." This statement alone made the story absurd since there are no placer interests in Southern California worth a "hill of beans," and there is little water down that way to work placers even if they existed.

The Mountain Copper Co., of Shasta county has bought out the old Judson sulphuric acid factory at West Berkeley and the San Francisco Chemical Co. and will go into the manufacture of sulphuric acid from its pyritic ores. At Keswick people object to the fumes from the smelter. The company has also been shipping pyrites to this city for the sulphur content and getting back the cinder to smelt; so it concluded to go into the manufacture of sulphuric acid. It was thought the Mountain Copper Co. would buy out the smelter of the defunct Copper King Mining Co. of Fresno county, with its smelter above Martinez on San Francisco bay. It was reported that $70,000 was offered for the smelting plant provided certain persons could be made to give clear title, etc., but this provision was not compiled with, and the smelter was not bought. The Mountain Copper Co., Lewis T. Wright, manager, is the largest concern of the kind in this State and makes a large annual product of copper, gold and silver.

There is still great demand for dredging lands. About all the land near Oroville has already been acquired, and the dredge men are going elsewhere in search of good ground. Just at present interest centers in the ground along the Yuba river between Marysville and Smartsville. Several large tracts in that vicinity are now under consideration, covering about 3½ miles of the river channel just below the source of the creeks which drained the rich hydraulic and placer mines of Timbuctoo, Smartsville, Sucker Flat and Mooney Flat, where many millions in gold were extracted in the pioneer days. As soon as the condition of the river will permit drills will start proving much of this ground.

People in Lone Pine mining district, on Bald mountain, Washoe county, Nevada, think they have good quicksilver indications and are now prospecting. Little work has been done, but a number of claims have been located. Under present market conditions good ore is needed to make mines pay. Quicksilver is not selling as high as it was, the output in this State exceeding the demand.

Denver. June 18.

(From Our Special Correspondent.)

The disturbed conditions caused by the serious labor troubles of the past few weeks continue the leading topic of conversation among mining men, but already signs of coming peace and consequent prosperity are appearing.

In the Telluride district, San Miguel county, martial law has been ended, and Governor Peabody has ordered C. H. Moyer, the president of the Western Federation of Miners, who has been imprisoned at Telluride for several weeks, to be turned over to the civil authorities. The order for this proceeding was issued before the governor had been notified of the decision of Judge Thayer, of the United States Circuit Court of Appeals at St. Louis, which ordered that Moyer be brought before that court on July 5. The writ cites Governor Peabody, Gen. Bell and Capt. Bulkley Wells to appear with the prisoner. A few days previous, before the ending of military law at Telluride, the militia made a general round-up of undesirable men in the district and such as were not working were told that they must either go to work or leave the county. They were also forbidden to enter into discussions which might lead to lawless acts.

Several trainloads of prisoners were deported from the Cripple Creek district, one to the vicinity of the Kansas line and one to near the New Mexico line, south of Antonito. The remaining military prisoners will be held and tried. A number of the deported men is said to be intending to return. The mines in the district are gradually starting up again, and by June 25 the normal number of miners will probably be at work. It is understood that the military will be removed within a few days, as the newly appointed civil authorities have the situation well in hand.

The trustees of the Stratton Estate, which is principally composed of mining property, although not expecting to realize in all cases the amounts which Mr. Stratton paid for various properties, have placed them on the market. It is stated that Mr. Stratton paid out over $7,000,000 cash and always protected himself from litigation by purchasing tributary claims, sometimes at high figures. The executors have not sufficient working capital on hand to carry out the plans he made.

The District Court in this city decided a few days ago the long-contested case of James Doyle against the Battle Mountain Gold Mining Co., the attorneys reaching an agreement after a jury had been called and sworn. Mr. Doyle is awarded $24,500 out of the $25,000 for which he sued, the amount being due as a balance on the purchase of his interest in the Uintah Tunnel Mining & Transportation Co., sold in 1898.

A large number of students of the Columbia School of Mines of New York and of the Massachusetts Institute of Technology in Boston arrived in this city a few days ago in charge of Prof. H. S. Munroe, of Columbia, who brings them West for practical study in the mining regions. For the first time since this summer school was started, the students will operate a mine outright, a part of the Pelican-Dives at Silver Plume, near Georgetown, having been leased. Every 10 days a number of the students will go to Idaho Springs for instruction in the mills at that point, which may be considered the center of concentrating practice in this State. A number of Harvard and Yale students are expected within a few days, and the party expects to be in Colorado for about two months.

James V. Burns, president of the Portland mine, is preparing papers in a damage suit for $100,000 for the closing of the mine by the military; attorneys of Chas. H. Moyer are drawing up papers in a suit for $50,000 against Governor Peabody, Gen. Bell and the State of Colorado.

Mr. Moyer will be held at Cripple Creek on a warrant charging him with aiding and abetting the murder of two men by an infernal machine at the Vindicator mine some time ago. It is understood that a number of other prominent union leaders are implicated in the same case.

The Teller county commissioners have appropriated the sum of $10,000 for necessary expenses in the way of a special prosecutor and other services for securing the conviction of the men guilty of causing the Independence explosion. Samuel D. Crump has been engaged as special prosecutor.

Salt Lake City. June 17.

(From Our Special Correspondent.)

Judge Marshall, of the Federal Court here, has rendered an important decision affecting placer and lode mining claims. Upon ground for which patents had been issued, as placer claims, certain parties discovered the presence of a mineral lode, located it and made the proper filings; these were a cloud on the title when the owners of the placer claims attempted to sell them, and it was necessary to clear the title before any transfer could be made. The Court declared the placer locations were good only where the lode does not run, and that the lode locators are entitled to the ground occupied by the lode to the extent of 25 ft. on either side of the center of the apex. As a part of the application for patent of the placer claims described a cross section of the lode, the patentees are given that portion of the lode in connection with the placer ground that is not covered by the lode location, the Court pointing out that the patentees, or their grantors, must have known that a lode was in existence. The Court also held that the lode locators were in no way trespassers, as the ground was plainly open to location under the law, placer patents to the contrary notwithstanding.

In suit brought by farmers owning land near the Utah Consolidated smelter, the Utah Consolidated Mining Co. being the defendant, the farmers sought to compel the company to purchase all the farms alleged to have been ruined by the poisonous fumes emitted from the stacks, or that the company be perpetually enjoined from operating the smelter. In his opinion Judge Marshall says:

"In a state of society the rights of the individual, to some extent, must be sacrificed to the social body; but this does not warrant the forcible taking of property from a man of small means to give it to the wealthy man, on the ground that the public will be indirectly advantaged by the greater activity of the capitalist. Public policy, I think, is more concerned in the protection of individual rights than in the profits to inure to individuals by the invasion of those rights.

"The case will be referred to the master in chancery to ascertain and report to the court the damage heretofore suffered by the complainants by reason of the operation of the smelter and for which they have not been heretofore

compensated or have received judgment, and the damage they will in the future so suffer by a perpetual operation of the smelter to the capacity of its operation as now contemplated: that is, the amount the right to continue the operation will decrease the present market value of the complainant's land. If within 30 days after the final assessment of this damage and upon tender to the defendant of proper instruments on the part of the complainants granting the right to continue the operation of the smelter, the defendant shall fail to pay the damage so ascertained, an injunction will issue. If, however, the defendant makes such payment, the bill will be dismissed."

The effect of the opinion is that the smelting company will have to pay the farmers for the damage that has been done and for all that may be done in the future. In other words, it amounts, practically, to buying the land within a certain radius of the smelter, the value of the property, past and future, to be estimated by the master in chancery, who will have to take evidence on the subject.

W. B. Mucklow, representing the larger stockholders of the Majestic Copper Mining & Smelting Co., has advised local creditors that he will be in this city early next week prepared to clear up some of the corporation's most pressing obligations. The larger shareholders recently subscribed $100,000 to be applied in this manner.

Spokane. June 15.

(From Our Special Correspondent.)

Regarding Le Roi fiasco, a recent editorial in the ENGINEERING AND MINING JOURNAL resenting the insinuation of a London paper about Mr. Parrish's illness is thoroughly justified. Mr. Parrish has been a sick man for many weeks, and has been in Spokane much of the time under the doctor's constant care. An operation for some nasal trouble started a hemorrhage and Mr. Parrish has not yet recovered. The change in his physical appearance is most marked.

The H. Y. at Thunder Mountain, Idaho, reports having contracted with the Colorado Iron works for a 20-stamp mill. Superintendent Abbott, of the Sunnyside mine, at Thunder Mountain, reports that a 42-ft. crosscut gave an average value of $33.89 a ton. Packers have started into Thunder mountain from Stites.

The Ladd Metals Co. has begun excavation on the site of its 60-ton copper smelter at Landore, Idaho, in the Seven Devils district. The plant should be running October 31. Ford Brothers are excavating for a large cyanide plant at Rapid River, Idaho, to work the ores of the Gold Coin Mining Co. It is a 200-ton plant. The Hercules mine at Burke, Idaho, is getting electric haulage for the lower tunnel. The power plant is working well and the tunnel is lighted by electricity. The company is driving one tunnel through the mountain to reach a fine body of timber that it owns, and to do away with the heavy cost of hauling lumber by wagon up the hill from Burke.

The Eastern Oregon Development Co., having a bond on the Morning mine near Sumpter, Ore., has brought suit against the original owners to enforce delivery of the property under the bond. The Bonanza mine in Sumpter camp, Ore., has quit mining below the 800 ft. level. At the Golconda only a small crew is at work, though the pumps are running. High grade ore is reported in the Eureka & Excelsior mine, recently reopened by Jonathan Bourne, of Portland, and the mill is running. The Columbia is sinking from the 700 ft. level, and is extracting ore from the upper stations. The mill is running steadily.

E. J. Roberts, of Spokane, representing Charles Sweeny, is at Marysville, B. C., to start work on the smelter for the Sullivan Group Company.

D. C. Corbin, of Spokane, has secured title under foreclosure of mortgage, on the Iron Mask mine at Rossland. He declared himself a trustee for all stockholders who should pay their pro rata of the company's indebtedness, and thus retain a proportionate interest in the property. Plans are being considered to form a new company.

J. D. Farrell, principal assistant to President J. J. Hill, of the Great Northern railway, has closed the iron properties at Valley, Wash., which he purchased about two years ago. Little information can be had about the success of the venture. W. S. Rogers, of Spokane, and Alf Gillon have bonded a group of seven iron claims near Valley for $25,000 from A. J. Young.

John Boyd, manager of the Palmer Mountain Tunnel Co., in the Okanogan district, has been at the property with a party of Eastern stockholders. The company is seeking to raise money for machinery.

Placer diggings on the Pend d'Oreille river, in Stevens county, Wash., have caused a small stampede. The Whirlpool Co. is preparing to start hydraulic mining. A 10-ft. ledge of free gold is reported on Sullivan creek, in the same district.

The Rambler-Cariboo mine in the Slocan, controlled by Spokane people, has been allowed to fill with water to the 300-ft. level, where stoping continues. The 80-ton concentrator is working steadily. About 40 men are employed. Compressed air has been used in driving the long tunnel, which is in 300 ft., and will be run 4,400 feet.

Duluth. June 18.

(From Our Special Correspondent.)

The coarse crushing side of the Oliver Iron Mining Co.'s big ore crushing plant at Escanaba is completed and begins crushing at once. The fine crushing plant is not completed yet, and some changes in details of arrangement are under consideration. The coarse crushing side uses one No. 9 Gates gyratory, and all ore taken to it is elevated from the crushing pit on a belt conveyor rising at an angle of 18° to pockets that discharge by gravity into cars for delivery to the shipping pockets at the harbor dock, a mile away. The crusher is set in a pit, and space is reserved for a second machine that will do the preliminary work for the rolls of the fine crushing plant. It is expected that the complete works, with both coarse and fine crushing sides, will cost about $150,000. The second half will be installed next season in all probability. The present side will have capacity for about 250,000 tons a year, and 250 h. p. is required to drive it. J. B. Driscoll is now in charge of the work.

A second crushing plant will probably be erected later at Two Harbors, Minn., for hard ores. There are now in Minnesota ore crushers at Tower mines, for the hard Soudan ores of the Oliver Company, and at Biwabik, for hard ores mined by the Biwabik Mining Co.

Every large mine of the United States Steel Corporation in the lake region, that is expected to be an important shipper this year, is forwarding ore in more or less quantity. This change has come with wonderful rapidity, for a week ago there were very few shipping. With outside and independent mines there is not so marked an improvement, though most of them are now busy. But in no case are mines shipping a full schedule, for boats have not begun to arrive rapidly enough. In a week or two the pace will be about that at the height of last season.

A private report just made on the amount of power installed, nearly all of which is in use, at mines of the two Minnesota ranges shows a total of 48,000 h. p. This is 18,000 h. p. in excess of about 16 months ago. It includes not only hoisting engines, but steam shovels in stripping pits and at stockpiles, dinkies and standard gauge locomotives used about mines, compressors, pumps, lighting and other electric plant, in short, all power used in getting out and handling ore at the mines. Of this stripping contractors on the Mesabi range alone have about 5,500 h. p., used for operating 21 shovels and attendant locomotives, mining companies have 24 shovels, used chiefly for stripping, and 42 for loading from stockpiles and from open pit mines. There are five shovels additional used for loading at Vermilion range mines. There are in all at the various Minnesota mines no less than 92 steam shovels, ranging in size from 50 to 110 tons. The standard size seems to be about 65 tons. The larger mines and groups of mines under similar management have been installing large and well equipped machine shops. Several firms of stripping contractors have done the same. The last mine to undertake this addition is the Biwabik, which is to erect machine and boiler shops with 12,000 sq. ft. floor space, covered by a traveling crane and equipped with the best machines.

The American Tinplate Co. has sent a crew of explorers from Duluth to North Carolina to test an ore property. Walter J. Croze, geologist with the Oliver Iron Mining Co. at Duluth, has charge of the new work.

Toronto. June 17.

(From Our Special Correspondent.)

The Provincial Government of Ontario has passed an order in Council by which the lands hitherto held in reserve within 10 miles of the Algoma Central & Hudson Bay Railway have been thrown open for settlement and mineral prospecting. Certain portions of this area were thrown open a few years ago and the restrictions excluding prospectors from the remaining area have now been removed.

T. G. Blackstock, of Toronto, has returned from a trip to Columbia. He states of the proposed amalgamation of Le Roi, Centre Star and War Eagle gold properties that negotiations are actively in progress, but have not reached a stage from which any definite result can be predicated. Much depends on the results obtained by new mills shortly to be put in operation.

J. H. Plummer, president of the Dominion Iron & Steel Co., with works at Sydney, Nova Scotia, closed on account of a strike, has arrived in Toronto from England. He says the present wage scale was fully on a level with current rates in eastern Canada. He will go to Sydney next week. The closing of the steel mills is likely to have an important effect on the Nova Scotia coal trade. For some time projects have been entertained for extending the market for Nova Scotia coal in Ontario, but the freight rates have been practically prohibitive. It was thought possible that this difficulty might be overcome, so far as water transportation is concerned, provided the steamers carrying coal west could obtain full freights both ways. The only commodity of sufficient bulk to give the coal-carrying boats return cargoes for which Nova Scotia offers a possible market is iron ore. Had the Dominion Iron & Steel Co.'s mills continued in operation large supplies of ore would have been needed.

E. J. Davis, Ontario Commissioner of Crown Lands, has given a decision in a long standing dispute involving valuable mining locations including nickel, silver and cobalt deposits in the neighborhood of Haileybury, Nipissing district, known as J. S. 14, R. L. 401, R. L. 402 and R. L. 403. After a hearing lasting several days in which 23 witnesses were examined, the case was decided in favor of Frederick Larose as the original discoverer. The other claimant was a man named King. Larose is a French-Canadian blacksmith, of Hull, Que., who at the time of the discovery was working on the construction of the Temiskanning & Northern Ontario Railway.

W. E. H. Carter, of the Provincial Bureau of Mines, has visited the principal limestone quarries and lime-kilns in southwestern Ontario from Toronto west to Lake Huron. The industry is at present very brisk and the kilns are working to their full capacity. Mr. Carter states that on account of the increasing scarcity of wood fuel soft coal has to be used for fuel, and can be satisfactorily substituted by the employment of a power-driven fan, which draws off from the upper part of the kiln a portion of the gases of combustion, and after mixing them with about an equal portion of air utilizes them for the forced draft. This mixture ensures the required length of flame without producing too hot a fire.

Victoria. June 14.

(From Our Special Correspondent.)

The manager of the Tyee Copper Co. reports that the smelter was in operation 18 days in May and treated 4,040 tons of ore which, after deducting freight and refining charges, yielded $47,028.

The gold commissioner at Atlin has given notice that the bed of Pine creek from Discovery to Gold Run being practically worked out, the

Government has decided to issue no new records, it being deemed advisable to keep this portion of the creek open for the benefit of those operating the benches on either side. By a recent judgment the Société Miniere obtained an injunction prohibiting miners working on Boulder creek from depositing tailings in that stream, a practice that had formerly greatly hampered the operations of the company.

At the Consolidated Cariboo hydraulic mine at Bullion, work is now in progress on a new 10 by 12 ft. rock tunnel to be driven 1,200 ft. The upraise through the bedrock will be some 70 or 80 ft. and will enter the pit about midway between the veins near the present face. The tunnel is designed to carry the sluice boxes, which will be paved with blocks. The prospects for a fairly successful season are said to be promising, and it is expected a first clean-up will be made in July.

The Elwood Tin-workers Mining Co., owning the Silver Dollar and other claims near Camborne, contemplates installing a compressor plant.

The telegram published last week from Ottawa announcing that Parliament had passed an amendment to the Lead Bounty Act, on the lines suggested by mine-owners, proves to be incorrect.

Rich ore is reported at a depth of 800 ft. on the Rambler Cariboo, near McGuigan. The vein varies in width from 6 in. to over 2 ft. and is reported to assay 170 oz. silver and 74.6% lead, while from the north drift the values were 136.3 oz. silver and 63.8% lead. The mill resumed operations last week. In the vicinity of Sandon there are now five concentrators working.

In the Nelson district the Juno is being satisfactorily developed, an upraise of 200 ft. has been run in ore. A drift is also being put in from the 200 ft. level exposing a fine body. In the Ymir camp the Star claim, adjoining the May and Jennie, has been bonded to the Canadian Smelting Works for $25,000. The ore which carries a considerable percentage of iron is required, it is understood, for fluxing purposes.

At Le Roi, at Rossland, Mr. Mackenzie, acting as consulting engineer, strongly urges the adoption of concentration for treating the low-grade ores, while continuing shipments of the higher grade ores and concentrates to the smelter at Northport. Le Roi Co. meanwhile owes the Bank of Montreal in excess of assets quickly realizable about $130,000. The building of the new White Bear concentrator at Rossland is proceeding apace, and it is thought the mill will be ready in about two months. A ledge of free milling ore between 3 and 4 ft. wide is reported found on the I. X. L. An important discovery has also been made on Le Roi No. 2 at the 600 ft. level as a result of boring, the core from 36 to 53 ft. assaying $4.75; from 53 to 56 ft., $54.50, and from 56 to 64 ft., $5.

On one of the high grade ore bodies, the Helen, near Greenwood, at which work was recently resumed, a small 10-in. lead has been encountered assaying from 8 to 9 oz. in gold, and 54 oz. in silver.

The coal mines at Morrissey, East Kootenay, are again in operation, and the recently constructed coke ovens will soon be blown in. The Crow's Nest Co. has orders well in advance, and the year is expected to be an exceptionally busy one.

Monterey. June 15.

(From Our Special Correspondent.)

In Chihuahua the Almoloya Mining Co., owning the Sultana, Altamirano and Iguana, will put in a 150-h. p. electric power plant at the Dorado station of the Parral branch of the Mexican Central railroad, 5 miles from the mines. This company has recently opened up some good pockets of ore on its properties adjoining the famous Cigarrero. There has been talk of the Guggenheims having an option for $15,000,000, Mexican, on the latter. The Guggenheim Exploration Co. is preparing to start up both the Verde and the Veta Grande, of the Parral district. At the former the old shaft, small portions of which will need retimbering for a depth of 600 ft., will be used; a large gas power electric generating plant will be erected for running the machinery. At the Veta Grande, which the company bought for $250,000 gold, electric pumps will be used for unwatering, the power being obtained from the same generating plant as the Verde. This mine has been idle 10 years.

In Jalisco the Central Mining Co. has bought the Jacobina Hacienda, on the border of Tepic for $40,000, Mexican, for obtaining power from the Santo Tomas river, where the company will put in Pelton wheels and Westinghouse generators. The power will be for the stamp mill and concentrator, machinery for which is on the way from Tampico to San Marcos, for shipment overland to the mines. Paul Brusky, of San Francisco, is reported having made a rich strike near Ameca.

In Oaxaca the Rosario y Anexas, of the Penoles district, is putting in a 10-stamp mill, and the United Mexican Mining & Milling Co. will erect an immense stamp milling, pan-concentration, roasting and chlorination plant for custom work in the Natividad district.

Johannesburg. June 7.

An investigation has been made of the accident at the Robinson Deep, by which 43 natives were killed, but the verdict is still secret. The evidence showed that the acid mine water had caused serious deterioration of the flat rope. The rope broke in the shaft under a load of 9 tons, but a test of a piece taken near the drum of the engine showed a breaking strain of more than 100 tons. Flat ropes on the Rand are about done for, and it is highly improbable that another flat rope engine will ever be erected here. The Robinson Deep Company is replacing the broken flat rope with a round rope.

The great event of the past fortnight was the signing of the agreement whereby Chinese labor is assured. This caused considerable stock market activity, although shares did not go as high as was predicted. The first batch of Chinese laborers is on the eve of departure, and by July 1 the new experiment with indentured labor will probably commence. The firm of H. Eckstein & Co. waives any right to the first four lots of laborers. The Farrar group will take over the newcomers. This group is in the eastern section of the Rand. The next mines to be supplied will probably be the Randfontein group, on the west section of the Rand. These two groups are more than 40 miles apart. Even if the Chinese laborers come by the thousands it will be months before their presence is visible in Johannesburg, for the outside districts require numbers of the immigrants. As far as possible, the Chinese will be kept separate from the Kaffirs. If both are employed on the same mine, a partition will be put up in the compound, dividing the quarters in two, one side for the black men, and one side for the yellow men.

This new departure in procuring labor will be watched eagerly, not only by the people of the Rand, but by the industrial communities of the world. That the Chinese will work well and prove a success seems fairly certain, but their very success will constitute a danger which must be watched. When other trades see what success the gold mining industry has with this form of labor, a plea for Chinese will be made, and if promiscuously granted there will indeed be the danger of a yellow peril in South Africa.

The Kaffirs view the approach of their yellow competitors with supreme indifference, possibly with delight, for if the urgent demand for labor ceased, many of them would stay at home instead of being sent to the industrial centers by their chiefs. When the Chinese get broken in, they will in all probability prove more efficient than the Kaffirs. The Kaffir does not take kindly to the contract system. He likes to rush through his work, and get up from the mine as quickly as possible. Double pay for double work has little attraction for him. The Chinese character is different. For money he will do almost anything. The Chinese miners will probably drill two holes per shift 3½ ft. deep when they get accustomed to the work, whereas the Kaffir will only put in one hole per shift.

The returns of the census, taken on the night of April 19, have been published. It is interesting to note how greatly the native population of the Transvaal outnumbers the white. In the census 945,598 persons are returned as aborigines, and 299,327 as of European birth or descent. Johannesburg has increased in population since 1890 285%, and the inhabitants within the municipal limits are 160,017, as follows: Whites, 52,106 males and 32,007 females; total, 84,113; colored, 68,538 males, 7,366 females, total 75,904. Pretoria shows a population of 15,539, a gain of about 6,000 since 1890. The grand total of the population of the Transvaal, including 23,891 Asiatics and half-castes, is 1,268,716. A significant feature of the census is the large preponderance of males over females in Johannesburg, the same condition as existed here before the war, showing that the high cost of living has proved too much for many heads of families. The returns prove that every effort must be made to change Johannesburg from a city of quarters to a city of homes. Such a disparity of sexes indicates an unhealthy economic state of affairs.

The small gain in the European population is readily accounted for by the war, the depression of the past two years, etc. With the establishment of the mining industry on a sound economic basis, it is hoped and expected that the tide of British immigration will steadily rise.

LANE CARTER.

London. June 11.

(From Our Special Correspondent.)

The opportunity for speculation in West Australian shares is becoming gradually smaller, and the speculation, such as exists, is confined entirely to Australian circles. A last desperate encounter between bulls and bears has just taken place in Boulder Deep Levels. This company belonged to the Gardner group and the management went to Bewick, Moreing & Co. a few weeks ago, at the same time as that of the Great Boulder Perseverance, though the actual transfer of the management in West Australia was only effected this week. The period between the announcement of the intended transfer and the formal execution of the arrangement was characterized by extraordinary activity on the part of speculators; all kinds of rumors were circulated and the shares fluctuated all the way between 2s. and £2. The actual facts appear to be that Mr. Ralph Nichols, on his return to the property after six months' holiday, re-sampled the mine in the same way as he did the Perseverance. In this case, as in the Perseverance, a careful sampling showed the average grade of the ore to be lower than when previous examinations were made. The results obtained in sampling these mines depend chiefly on what ore is included in the estimates. When a mine is examined under Bewick, Moreing & Co.'s rules all ore is included which, when mined with higher grades will give an all round profitable product; consequently the average content is lower than if the ore that would not pay to work by itself is excluded. It is probable that the Perseverance yearly rate of dividend will be reduced by the adoption of this system, but the dividends will last much longer, costs will be reduced, and more gold will be won.

Another of the West Australian gold mines has issued its report for 1903 this week, the Great Boulder Proprietary. This mine has not joined the Bewick-Moreing management, and, in fact, it seems to be able to jog along quite comfortably without requiring any change of control. The company has been in existence exactly 10 years and has paid dividends regularly the whole time, the total amounting to 970% on a capital of £175,000. For 1903 the total distribution was £262,500, in addition to which £50,000 were placed to the depreciation fund account, which now amounts to £90,000. Exploration and development during the year have been entirely satisfactory and the ore reserves are estimated at 323,000 tons, averaging 1¼ oz. per ton, being sufficient for three years' work in the mill. Only ore opened up on three sides down to the 1,600-ft. level has been included in this estimate, and the existence of other ore is well ascertained. I anticipate keen rivalry between the management of this mine, which is in the hands of Messrs. Doolette Waddington, and Richard Hamilton, and the firm of Bewick, Moreing & Co., as regards reduction of costs. In emulation of the latter firm's achievement in this direction the Great Boulder Proprietary has already effected important economies.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of the ENGINEERING AND MINING JOURNAL.—Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL, and making this office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and be of any service to them that they can.

TO ENGINEERS VISITING LONDON.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers nonresident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution, and thus enjoy the advantages of temporary office accommodations in the city of London.

PERSONAL.

Mining and metallurgical engineers are invited to keep the ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. R. W. Petre is examining gold mines in Nova Scotia.

Mr. George H. Wright is on his way from London to Singapore.

Mr. Percy A. Babb is at Matehuala, in San Luis Potosi, Mexico.

Mr. R. A. F. Penrose sails by the *Sierra* on July 7 for Australia.

Mr. J. J. Blow, from Hermossillo, in Sonora, Mexico, is visiting New York.

Mr. G. W. Myers, of the Chrome Steel Works of New York, has gone to Alaska.

Mr. P. S. Couldrey, formerly at Rossland, B. C., is about to proceed to Australia.

Mr. Arthur Hiorns is at Soemalata, in the Celebes group of the Dutch East Indies.

Mr. F. J. Pope, of Ricketts and Banks, has returned from examining mines in Maine.

Mr. C. Hennige is geologist and surveyor at Palehleh in the Celebes, Dutch East Indies.

Mr. J. Parke Channing is expected in New York about July 1 on his return from Arizona.

Mr. Ottokar Hoffman has moved from Argentine, Kan., to 1710 Jefferson street, Kansas City.

Mr. A. A. Blow has returned from Australia; he was in New York on June 16 and is now at Baltimore.

Mr. W. Bowen Evans, from Reefton, New Zealand, sailed by the *Campania*, on June 18, for London.

Mr. R. Macbeth, of the Lucky Boy mine at Custer City, Idaho, has been visiting the Exposition at St. Louis.

Mr. Wilbur E. Sanders has been appointed manager of the Mogollon Gold & Copper Co. at Cooney, New Mexico.

Mr. L. H. Wilkins, superintendent of the Darling mine, near Georgetown, El Dorado county, Cal., is in London.

Mr. Lionel Lindsay, recently a student at the University of California, will sail on June 25 by the *Etruria* for England.

Mr. H. M. Deavitt, the Chicago representative of the Engineering Company of America, has been on a visit to New York.

Mr. J. J. Turnbull, general manager of the East India Coal Co.'s collieries, in Bengal, is visiting the St. Louis Exposition.

Mr. Philip Henry Argall, son of Mr. Philip Argall, of Denver, is assistant chemist at the Selby smelter, near San Francisco.

Mr. J. W. Mercer, general manager of the South American Development Co., Zaruma, Ecuador, was in Denver on June 14.

Mr. Daniel A. Jones, formerly with the Buffalo, Rochester & Pittsburg Railway, will open an engineering office at Nome, Alaska.

Mr. Walter H. Bunce sails from New Orleans by the *Alabama* for Nicaragua, as consulting engineer to the Deitrick concession.

Professor C. Schiffner, of Freiberg, sails by the *Hamburg* on July 7 and will visit the metallurgical establishments of the United States.

Mr. Geo. D. James, mining engineer of Denver, is near Frisco and Curtin in Summit county, Colo., but will return to Denver shortly.

Mr. Alfred C. Garde, manager of the Payne Consolidated Mining Co., at Sandon, British Columbia, has been visiting the St. Louis Exposition.

Mr. Cortlandt E. Palmer, of Colorado Springs, will take up residence in New York and become assistant to Mr. J. Hays Hammond, with offices at 71 Broadway.

Mr. F. A. Thomson, a graduate of the Colorado School of Mines, has been appointed superintendent of the New Western Reduction Co. at Forks Creek, Colorado.

Mr. Ellsworth Dagget, of Salt Lake City, has been appointed manager of the mining interests of J. Phelps Stokes, near Eureka, Nevada, in place of Col. S. T. Pearson, resigned.

Mr. J. D. Hawkins, general superintendent of the United States Reduction & Refining Co.'s Colorado properties, recently inspected the Utah Copper Co. properties at Bingham, Utah.

Mr. Louis Katona, metallurgical engineer of the steel plant of the Privileged Austro-Hungarian State Railroads at Resicza, Hungary, is in this country inspecting the large steel plants.

Mr. Henry Ventress, assayer at the Centennial-Eureka mine at Eureka, Utah, for the past five years, has resigned. He is now assayer at the smelter of the United States Mining Co. at Bingham Junction, Utah.

Mr. Frank H. Jackson, who for the past 15 years has been devoting his time to the portland cement industry, has resumed the practice of mining engineering. His office is at 405 Trust Building, Los Angeles, California.

Mr. J. C. Ralston, mining and hydraulic engineer, of Spokane, Wash., has recently undertaken the installation of a large hydro-electric power plant for the North Mountain Power Co. of California, in Trinity and Humboldt counties, and is devoting about half his time to this work.

Mr. B. B. Lathbury has retired from the engineering firm Lathbury & Spackman, Inc., Philadelphia, severing his connection with the company. The business of Lathbury & Spackman, Inc., will be carried on under the name of the Henry S. Spackman Engineering Co. by Mr. Henry S. Spackman and the old staff.

At the alumni dinner of the State University of Iowa, the former students of Professor Samuel Calvin, to the number of over 2,000, united in the commemoration of the completion of his thirtieth year in a professorship at that institution. The recognition took the form of a costly silver loving cup, a classic Greek vase 16 in. high, standing on a base of serpentine 5 in. high. It is adorned with casts taken directly from fossils, with a drainage-map of Iowa, with crossed geological hammers, a microscope, and the more conventional spray of laurel, owl of wisdom and torch of learning—all in relief. One side bears an appropriate inscription in raised letters. Professor Calvin was made professor of natural history in Iowa's university 30 years ago. The "chair" has since been subdivided into four distinct departments, Professor Calvin retaining the department of geology. He has been State geologist of Iowa for the last 12 years.

OBITUARY.

Howard C. Walters, a mining promoter of Washington is dead at Seattle. He organized many northwestern and Mexican mining companies.

William Keyser, for many years second vice-president of the Baltimore & Ohio Railroad, recently died at his home in Baltimore, Md., at the age of 69. Mr. Keyser was at one time president of the Baltimore Copper Rolling & Smelting Company.

William Sumner Hungerford, a graduate of Yale and of the American Institute of Mining Engineering died June 19, at Arlington, N. J. He was 49 years old. The greater part of his professional life was passed in Colorado, where he made a reputation as an expert mining engineer.

Charles Wade Stickney in a fit of despondency shot his wife and himself at his home at Mountain View, Cal. It is believed that his act was caused by his brooding over the incurable illness of his wife. Mr. Stickney, who was of English birth, was a graduate of Harvard and about 60 years of age. He was a member of the American Institute of Mining Engineers., and was an able metallurgist. In the latter days of his life he devoted much attention to mining law, having been appointed to the Idaho bar in 1899. Prior to 1894 Mr. Stickney was connected with the Parrot Co., at Butte, Mont., and during this engagement investigated processes for bessemerizing copper matte. He published contributions on the subject in the ENGINEERING AND MINING JOURNAL in 1893, and in *The Mineral Industry*, Vol. I. As a result of his careful study of the metallurgy of copper, Mr. Stickney in 1893 patented a process for roasting sulphur-bearing ores. In 1899, after five years' service as general manager of the Phi Kappa Mining Co., of London, with property in Custer County, Idaho, Mr. Stickney tendered his resignation to become a practicing attorney. He was a strong advocate of the revision of the United States mining law, and did not hesitate to express his views freely, as is proved by his contributions to the JOURNAL in the early nineties.

SOCIETIES AND TECHNICAL SCHOOLS.

MINING AND MECHANICAL INSTITUTE.—This institution at Freeland, Pa., has received a gift of $50,000 from Mrs. Coxe, widow of Eckey P. Coxe, the founder.

SOUTH DAKOTA SCHOOL OF MINES.—The sixth annual commencement of this institution was held at Rapid City on June 1. There were four graduates.

MONTANA SCHOOL OF MINES.—At the second annual commencement of this institution at Butte, 10 graduates received diplomas. Among them were two women.

STEVENS INSTITUTE OF TECHNOLOGY.—The 32d commencement of this institution, at Hoboken, N. J., was held on June 16. Fifty-two young men were graduated with the degree of Mechanical Engineer.

ENGINEERS' CLUB OF PHILADELPHIA.—At the meeting on June 4 Mr. S. S. Sadtler's 'Notes on the Use of Lutes' were discussed by E. M. Nichols, James Christie, F. E. Dodge and George C. Davis. Col. E. D. Meier explained the 'Recent Developments in the Diesel Engine,' and the discussion was participated in by John D. MacPherson and Messrs. Nichols, Ballinger, Hering, Head, Perrot and others. The next meeting of the club will be on September 17.

AMERICAN CHEMICAL SOCIETY, NEW YORK SECTION.—On June 10 the last regular meeting this season was held at the Chemists' Club. Papers read were: 'Alloys,' by Wm. Campbell; 'The Optical Rotation of Some Cyclic Compounds,' by F. D. Dodge; 'The Determination of Formaldehyde,' by R. H. Williams. The following officers for the year 1904-05 have been elected: Chairman, W. J. Schieffelin; vice-chairman, F. D. Dodge; secretary-treasurer, F. H. Pough; executive committee, E. H. Miller, Wm. McMurtie, T. J. Parker and M. T. Bogert.

OHIO SHIPPERS' ASSOCIATION.—J. McCord, of Columbus, O., secretary of this organization, has sent out copies of the constitution and by-laws of this association, lists of the officers and committees for the current year and a copy of an agreement made on March 12 with all the railroads in Ohio. The intent of this agreement is to secure a uniform application of car service rules, and it contains a provision for the appointment, on request, of three representatives by the railroads to meet three representatives of the association, this joint committee to take up and adjust appeals and other matters which may come before it. The association has among its members many prominent manufacturing concerns, and expects that its agreement with the railroads will be of more direct benefit than an appeal for legislative action.

INDUSTRIAL.

The address of the American Foundrymen's Association is now Watchung, New Jersey.

The Alaska Treadwell Gold Mining Co., at Douglas Island, Alaska, has experimented favorably with the Little Wonder air drill made by Martin Hardsocg, Ottumwa, Iowa.

Adam Cook's Sons, of New York City, are sending out copies of testimonial letters received from satisfied users of Albany grease. Adam Cook's Sons claim that the use of this lubricant will reduce oil bills one-half.

An order has been placed with the Salt Lake branch of the Mine & Smelter Supply Co. for cyanide equipment for the Revenue mine in Montana, which is under the control of Samuel Newhouse.

The Sanford-Day Iron Works of Philadelphia, is prepared to receive orders for the car wheels formerly manufactured by A. Whitney & Sons and the Whitney Car Wheel Works of Philadelphia. Asa W. Whitney, under whose chemical supervision the foundry work of the above establishments was carried on for the last eight years of their operations, has charge of the same department of these works.

The Engineering Company of America announces that heretofore it has been engaged in purely professional work, but on June 1 decided to engage also in general engineering, construction and contracting business. It is prepared to undertake all kinds of general contracting work, and desires bids from sub-contractors on a large amount of work it has at its office in New York City, covering electric railroad construction, water works, power houses, refrigerating plants, buildings, etc., details of which will be furnished on application.

The New York Belting & Packing Co., Ltd., announces its removal to spacious stores at 91 to 93 Chambers street and 73 to 75 Reade street, between Broadway and Church street, New York. For some time the company has felt the need of larger quarters for its steadily increasing business, but until now has been unable to find a suitable and conveniently located building. The company has in its new quarters a special room for telephone service, facilities for correspondence, etc., for the convenience of its friends, and invites them to make headquarters there while in the city.

The Lake Superior Corporation has perfected its permanent organization by electing, on June 9, the following officers and directors: President, C. D. Warren, president of the Traders' Bank, Toronto; vice-president, Charles E. Orvis, of New York; secretary, Thomas J. Drummond, of the firm of Drummond, McCall & Co., iron merchants of Montreal. Directors: J. Tatnall Lea, president First National Bank, Philadelphia; Charles S. Hinchman, Philadelphia; Francis B. Reeves, president Girard National Bank, Philadelphia; John T. Terry, vice-president Mercantile Trust Company, New York; Dumont Clarke, president American Exchange Bank, New York; George B. Turrell, president Mutual Trust Company, Orange, N. J.; N. W. Rowell, King's Counsel, Toronto, and F. H. Clergue, the original promoter, Montreal. John T. Terry, Jr., was elected treasurer and Edward White assistant treasurer. The directors have provided $1,000,000 to be used as working capital. Work at the plant will start at once.

The Newhouse Mines & Smelter Corporation has adopted Westinghouse steam turbines and electrical apparatus for furnishing power at its mining operations in Utah, and for local lighting. Turbines of the same make were recently adopted by the De Beers Mining Company, Limited, South Africa, where two 1,000 kw. Westinghouse-Parsons turbines are already in operation and a third is under construction. The Newhouse Mines & Smelters Corporation's new power station is 12 miles from Frisco, Utah. Electric power will be used to operate the mining machinery and to furnish light for the town of Newhouse. Power will be generated at 440 volts and transmitted at 2,300 volts a distance of 9,000 ft. from the power plant to the mines, where it will be stepped down to 400 volts for the motors in the concentrating mill and the crushers situated at the mouth of the tunnel. There will be a motor generator set for the operation of mining type locomotives in the main tunnel. The entire electric system is 3-phase, with a frequency of 7,200 alternations per minute. The generating plant consists of two 400-kw. Westinghouse-Parsons turbines with 3-phase generators of like capacity. The turbines will operate under 150 lbs. pressure, 27 in. to 27½ in. vacuum, and approximately 80° F. superheat at the turbines. An individual surface condensor will be provided for each turbine. The boiler plant will consist of three 280-h. p. Babcock & Wilcox boilers operating at a steam pressure of 155 lb. gauge, with superheat at the boilers of 100° F. The plant is being erected and equipped under the charge of Robert F. Moser.

TRADE CATALOGUES.

The Rand Drill Co., of New York, is sending out a unique mailing card in the shape of its new "Imperial" hammer.

Furman steam and hot water boilers are described in detail in a very attractive catalogue, issued by the Herendeen Manufacturing Co., of Geneva, N. Y.

The Exeter Machine Co., Pittston, Pa., has built an engine weighing 150 tons, to be used by the Susquehanna Coal Co. at Williamstown, Pa. This is the largest engine turned out at these works.

Leaflet No. 130, issued by the Northern Electric Manufacturing Co., of Madison, Wis., describes, with a cut, the Northern spherical motor driving Fay buzz saw, which is one of the standard products of the company.

The Great Lakes Engineering Works, of Detroit, Mich., has issued a catalogue of its marine engines, hydraulic dredging machinery, air compressors, marine boilers and machinery and semi-steel propeller wheels. It is illustrated, and contains a great deal of interesting information for prospective buyers of such machinery.

Fairbanks, Morse & Co., Chicago, Ill., have published catalogue No. 48, which shows an extensive line of their pumps, including those for boiler feed, fire service, mine pumps, direct-acting vacuum pumps and artesian well engines. Sectional cuts of pumps are included, showing the internal mechanism. The capacities and power of the different pumps are figured out to a nicety and given in numerous tables.

The Redwood Manufacturers Co., of San Francisco, Cal., has issued a catalogue descriptive of its doors and sash moldings and tanks. It contains much general information concerning the company's plant, and is provided with an abundance of cuts. Another catalogue sent out by the same company contains descriptions of cyanide plants and accessories. This also is illustrated with excellent cuts.

'South African Rock Drill Tests,' a convincing leaflet just published by the Rand Drill Co., of New York City, is a fac-simile reproduction of a page taken from the Johannesburg Star, and contains an account of the drill tests carried on by the Engineers' Association of the Witwatersrand. The circular is folded and addressed on the back, and has been sent to all mines and mine owners. The verbatim report of the engineers finds for the drills of American make, and Mr. Docharty supplements his article by the remark that "the Slugger approaches the ideal."

GENERAL MINING NEWS.

ARIZONA.

GILA COUNTY.

(From Our Special Correspondent.)

Colorado.—A 100-h.p boiler and a double-geared steam hoist will be erected at this mine.

GRAHAM COUNTY.

Arizona Copper Co.—This company in Clifton has commenced handling the tailings from their Longfellow plant. For some time the company has been disintegrating its slag by water, and then allowed it to find its way to the Frisco with the tailings from the plant. This system has been abandoned and the old slag train again put into service. In addition to the slag the company is now handling about 400 tons of tailings daily.

Detroit Copper Co.—It is reported that this company at Morenci will expend $300,000 on a new concentrating plant.

Polaris Mining Co.—On the Golden Eagle claim in Clifton an ore body 6 ft. wide is reported to be uncovered.

(From Our Special Correspondent.)

Home C. Co.—At this mine, near Morenci, a tunnel will be driven under the mountain. This will open one mine the entire way and parallel another tunnel a few feet east.

MARICOPA COUNTY.

(From Our Special Correspondent.)

National Copper & Gold Mining Co.—This company has taken an option on the Rogers Springs copper mines from Gates M. Fowler, of Phoenix, for $60,000. The mines are situated about thirty miles north of Phoenix and belong to W. E. Marlar.

Phoenix.—A good body of gold and silver ore is reported at this mine in the Cave creek district.

MOHAVE COUNTY.

(From Our Special Correspondent.)

Buckeye.—A good sized vein of ore has been developed in this mine, at Mineral Park. C. Neilson is operating on a bond and lease from C. E. Lovett, of Los Angeles, Cal.

Jersey Lily.—A bond and lease have been taken on this mine by J. Hoffman from J. P. Finegan and others. Preparations are under way for extensive developments.

Mohave Gold Mining Co.—This company at Mohave City operating on ore from the Leland and Midnight mines, paid a dividend of $25,000 in May. The stopes have been opened on the tenth level and the ground will be cut out to the surface.

Oro Plata.—A good body of ore has developed at this mine in Todd Basin. Frank O'Dea is operating on a lease from J. W. Gerritt.

PINAL COUNTY.

Fortuna.—This mine at Kelvin is producing silver-lead ore. J. L. Horn is the owner.

Lake Superior & Arizona Mining Co.—This company at Kelvin has 20 men developing its property.

YAVAPAI COUNTY.

Poland Extension Gold Mining & Milling Co.—A consolidation of this mine with the American Gold & Copper Co. to form the Poland-American Mining & Milling Co. is announced The properties adjoin.

Val Verde Copper Co., Ltd.—This company has sold its custom copper smelter at Val Verde to the Bradshaw Mountain Copper Mining & Smelting Co. The new owners will add numerous improvements to the plant and erect steel buildings. The smelter will continue to handle custom ores. S. W. Middleton is vice-president and manager of the Bradshaw Mountain Copper Mining & Smelting Co.

CALIFORNIA.

AMADOR COUNTY.

Consolidated Fremont Mining Co.—This company at Drytown Arthur Goodall, manager, is still closed down owing to the miners' strike. The sand flume at the mine is nearly completed.

Kennedy Mining Co.—At this mine, Jackson, grading for the addition of 40 stamps to the new mill has been finished and the concrete work is now being put in. The 40 stamps of the mill at the old shaft are being moved to the new east shaft, where they are to be added to the new 60-stamp mill.

Kimball Properties.—On the Deadwood, one of the four claims owned at Defender by Kimball & Sons, a small hoist has been set up over a shaft 200 ft. deep. On the Pioneer Extension, another of their claims, a 400-ft. tunnel has been run.

Red Tape.—This property at Defender has again started up.

Wildman.—At this old mine at Sutter creek, John Ross, Jr., manager, it is expected that work will shortly be resumed with a large force.

CALAVERAS COUNTY.

Benson.—A mill is being erected at this mine, Angel's, John C. Benson, manager.

Gertrude Mining Co.—This company is arranging to start up the Demarest mine at San Andreas.

Gwin.—At this extensive property, near Gwinmine, F. F. Thomas, manager, 300 men are at work, and the 80-stamp mill is kept steadily running.

Huberty Estate.—The gravel properties of this estate have been bonded by parties who will commence work at once. The mines are about a mile from San Andreas.

ELDORADO COUNTY.

Pyramid.—At this mine on Dry Creek, shaft sinking has been resumed and the mill is running on good ore.

Red Raven Gold Mining Co.—This company has been incorporated at Los Angeles to work the Red Raven mine, comprising 10 claims near Shingle Springs. The directors of the new company are J. C. Newton, A. F. Levitt, C. L. Whipple and F. D. Parker, of Los Angeles and F. C. Farnell, of Lockport, N. Y.

Telegraph Mine.—Geo. L. Waggoner and David Upton have applied to the California Debris Commission for a permit to work this mine near Indian Diggings by hydraulic process.

Ward.—The Colorado men who are working this gravel mine at White Rock canyon have bought Col. Root's gravel mill at Reservoir hill and are putting it on their mine.

KERN COUNTY.

Keys.—This old mine at Keyesville, is being profitably worked by J. B. Ferris. The mine has been idle until recently since 1868.

Mohave Copper Co.—It is reported that this property in Copper Basin, may shortly be purchased by New York men.

Pine Tree.—At this mine, Gold Pan Cañon, near Caliente, a 5-stamp mill is being erected by the owners, Messrs. Ferris, Swartz, Boats and Scovern.

Portuguese.—A 5-stamp mill is being erected on this mine near Vaughn, by J. B. Ferris. It will be partly used as a custom mill.

Yellow Aster Mining Co.—In one day recently this company at Randsburg put 600 tons of ore through their mills, the largest amount ever milled by them in one day.

Wedge.—Snipsey Bros. & Montgomery are successfully working a lease on this mine at Randsburg.

MONO COUNTY.

Dawn of Hope.—Sherwin Bros. are working this mine near Benton, and have made a recent satisfactory clean-up. There is a 5-stamp mill and cyanide plant on the claim.

Standard Mining Co.—This company at Bodie, has been experimenting with the Moore slimes process for some months and is to use it at the mill. The old tailings plant will be remodeled into a direct process slimes plant to take the tailings as they come from the mill, instead of from storage ponds.

Syndicate Mill.—This mill at Bodie, has been put in shape and is now operating on Parr & Parr's ores. Lessees' ores will shortly be treated.

NEVADA COUNTY.

Charronat.—This group, known also as the Canada Hill group, now belongs to J. F. Littlefield, of San Francisco. Work is to be resumed at once.

Grizzly Hill.—This claim has been purchased from Gilbert Hall by C. L. Canfield, and will be developed at once. It lies on the north side of South Yuba river across the stream from the Blue Tent claim. The Grizzly Hill was formerly operated by hydraulic process, but is now to be "drifted." There is ample water supply. Superintendent Cliford Graham, of the Blue Tent Co., will be superintendent.

PLACER COUNTY.

Bald Mountain.—Work has begun on the drain tunnel, which will tap the channel at a depth of 200 ft. below the old tunnel.

Emma Consolidated Mining Co.—At this mine at Burnt Flat, concentrating machinery will be installed. There is a large mass of low-grade ore to be handled.

PLUMAS COUNTY.

Claybank Tunnel.—Some months ago, in this mine near La Porte, a 'sand streak' was tapped in upraising a shaft and about 200 ft. of the tunnel filled up. Since then every care has been taken to prevent a repetition, but recently, while the last shaft was being raised, notwithstanding the care taken, a rush of water and sand came in which filled up the entire tunnel for 500 ft. so that work has been entirely suspended.

Dunn Bros. Mine.—At this mine, Butt Valley, a rich discovery of quartz has been made.

SAN BERNARDINO COUNTY.

Dale District.—The Supply mine is being worked by the Co-operative Mining Co., of Chicago. Considerable development work has been done and a mill and cyanide plant have been put up. The shaft is down 400 ft. The Ivanhoe has started its mill and mine. The Seal of Gold Co., owning the O. K. mine, has its stamp mill nearly ready for operation. At the Virginia Dale mines a new hoist has been erected.

Fearnot.—At this mine near Victor, considerable development work is to be done, and arrangements are being made for a larger mill.

Grub Stake Mining Co.—At this mine, 30 miles north of Daggett, a short tunnel has already been driven and ore has been found carrying silver and copper.

SAN DIEGO COUNTY.

Free Gold Mining Co.—At this property, better known as the Golden Cross, at Hedges, H. A. Barker has been made receiver in place of Chas. W. Pauley, resigned. Mr. Pauley has managed the mines during the long-pending litigation.

Stonewall.—At this mine at Cuyamaca, near Julian, a new company known as the Cuyamaca Co. has taken charge and intends to develop the property. The president is E. B. Tustin, of New York; G. H. Clarke, of Auburn, Me., is the new general manager; J. K. Wilson, of San Francisco, is the Western director; Col. S. H. Lucas will be superintendent.

SHASTA COUNTY.

Gambrinus.—Active work has begun on this mine at Whiskytown, by the Colorado company represented by J. A. Glass, who lately bought the property from Barner & Riebe. A 10-stamp mill is on the ground and a 4-mile ditch is being repaired.

Midas Gold Mining Co.—At this mine at Knob, Manager L. A. McIntosh is to start important improvements. A new hoisting plant is to be installed and a new shaft sunk. This mine is the largest single gold producer in the county.

SISKIYOU COUNTY.

Advance.—At this mine, China Gulch, Superintendent Lewis has found a rich bunch of ore in the tunnel on the 70-ft. level.

Ager.—The coal mine near this place, after lying idle some months, is again to be worked. New machinery has been provided.

Garrettson Springs.—Some rich cinnabar ore is being taken from the mines near this place.

Golden Eagle.—The new mill on this mine, Indian Creek, is about ready.

Sheba.—At this mine, on Patterson creek, a wide and rich ledge has been encountered.

Taylor Creek.—On this creek, a branch of Salmon river, numbers of prospectors are at work. Rich ore has been found by Edward Harris and his partners.

TEHAMA COUNTY.

Basler.—At this mine, C. M. Basler, superintendent, more men are being put on to develop the new find.

TRINITY COUNTY.

Potillo.—This group of mines in Mt. Bally, Weaverville district, has been bonded to M. G. Womack, of Hay Fork. The price is $30,000.

Quimby Mining Co.—This new company has been organized in San Francisco to open the Quimby mines at New river. The directors are: J. A. Brent, C. A. Marriner, J. M. Duke, W. A. Merrals and W. R. Beale.

TUOLUMNE COUNTY.

Doyle Gravel.—This mine, now called the "Ranch," has part of the new machinery on the ground.

Draper.—At this mine a large compressor is being installed and 25 men are at work. The mine is being unwatered.

Longfellow.—The owners are preparing to equip this mine with improved machinery.

COLORADO.

BOULDER COUNTY.

Boulder County Mining Co.—This company is cutting a tunnel through its property. An 8-drill compressor has been installed. The tunnel is in 1,200 ft. C. F. Lake, of Boulder, is superintendent.

Camilla.—The tunnel at this mine at Buena Vista is planned to penetrate Pomeroy mountain 3,000 ft. Seven veins have been cut.

Enterprise Mining & Reduction Co.—This company is operating its mine on Spencer mountain. An aerial tramway from the mine to the mill is said to be contemplated. The mine is equipped with an 8 by 10 hoist and 60 h. p. boiler. The shaft is 400 ft. deep.

Pilot.—At this mine at Wallstreet a new 80-h. p. boiler and Hendrie & Bolthoff hoist have been installed, and the development work is being pushed as rapidly as possible. The mine is in charge of Charles Pate, of Sunshine.

CHAFFEE COUNTY.

Badger.—At this mine at Turret the new ore body coming into the shaft, which is now a little more than 175 ft. deep, is said to be widening as depth is gained and the ore panning free gold.

Buena Vista Mining Co.—This company at Buena Vista has its tunnel under cover about 30 ft.

CLEAR CREEK COUNTY.

Golden Cloud.—This mine in the Russell district is said to be producing from 100 to 125 tons of ore a week.

Golden Lily.—A strike is reported on the Little Clair lode of this mine at Georgetown.

Mazeppa Mining & Milling Co.—This company at Georgetown will award a contract for 100 ft. of development work. The company is composed of St. Paul and Duluth capitalists.

Santa Fe Gold Mines Co.—This company, which has been driving a tunnel into Santa Fe mountain to intercept the Gomez lode, has reached that body. A 6-in. streak of black sulphuret said to carry $2.88 gold and $1.70 silver was uncovered.

GRAND COUNTY.

Sulphur Springs.—An important gold discovery is reported to have been made at this place in the northwestern part of the county.

SAN JUAN COUNTY.

Gold King Consolidated Mines Co.—A report is current that an English company is considering the purchase of these mines at Silverton.

LAKE COUNTY—LEADVILLE.

(From Our Special Correspondent.)

Anna.—At this mine in Iowa gulch values still keep up to 15 oz. gold per ton. All the first-class ore is being sacked and the balance goes to the smelter.

Cleveland.—This shaft, belonging to the New Monarch Co., has gone through 185 ft. of quartz, near the center of which was found a streak that ran over three oz. gold. A rich body of iron sulphide was encountered running 10 oz. gold, 37 oz. silver and 10% lead. The drift is being driven ahead to the Winnie and is still in ore. The company will erect a mill to treat the output.

Cloud City.—A fault in the lower level has been driven through; good lead carbonate was opened above it.

Peerless Maud.—In a drift started from the Cameron claim to connect with this mine in the Horsehoe district, a good body of lead ore has

been uncovered running from 97 to 160 oz. silver and from 40 to 70% lead. This makes two distinct ore shoots in this territory.

TELLER COUNTY—CRIPPLE CREEK.

(From Our Regular Correspondent.)

Strike Situation.—The general situation in the district is now peaceful and quiet, though martial law still prevails and a few arrests are being made. About 35 more men have been deported, making in all about 140 that have been sent out of the district. With one or two exceptions the mines are all working again and the outlook is good. There are plenty of good men to be had, the criminals and agitators are either in custody or have been deported, and the community is rid of the gang of ruffians that has terrorized and dominated it so long. Every effort is being made by the civil authorities to bring to justice the perpetrators of the terrible crime at Independence. About 60 men are in jail, held on charges of murder or other crimes. At present it seems as though a number of the union leaders would be implicated.

C. O. D.—In this property in Poverty Gulch, Clint Tillery and associates are finding some good ore. A large amount was taken from the property a number of years ago, but recently none has been taken out, though a large amount of development work has been done.

Gold Coin.—A number of the leasers continue to make money. The property was shut down for a few days, but opened again.

Portland Gold Mining Co.—This property is still shut down. It was about the only mine in the district working union men, and as some of them were wanted by the authorities the mine was closed by the militia. It will probably start work again in a few days.

W. H. P.—This property continues to ship good ore, and it is said that the leasers made more money in May than in any month since the strike was made in January. The mine is on Ironclad hill, is owned by one of the Woods companies, and probably has some of the richest ore that has ever been found here.

IDAHO.

BLAINE COUNTY.

Argosy.—This mine at Hailey, has been purchased by Pocatello people for $12,000. Development work will begin at once.

Hattie Grant.—Work has been resumed at this group of mines at Hailey.

IDAHO COUNTY.

Mollie.—At this mine at Roosevelt, a 20-stamp mill will be installed.

Sunnyside.—The west cross-cut on this mine at Roosevelt has been driven 208 ft. and drifted on for 137 feet.

SHOSHONE COUNTY.

16 to 1.—At this mine, near Wallace, the mill is to be overhauled preparatory to making shipments. A strike has been made in a drift run from the lower tunnel, which is about 400 ft. deep. A raise will soon be started for the upper workings, about 225 ft. above.

Amador Consolidated Mining Co.—It is reported that this company, owning property near Mullan, will install a smelter this year and has $200,000 raised for that purpose.

(From Our Special Correspondent.)

Beartop Mining Co.—This company's mine is on the north side of Pritchard creek, 6 miles east of Murray. A system of adits shows a vein of lead-silver ore. C. C. Groesbeck, the manager, has equipped the property with an air-compressor, power drills and a Joplin concentrator. The company is made up of Toledo, O., people, associated with whom are Messrs. M. S. Simmons, David Avery and A. T. Simmons, of Murray.

Golden Chest Mining Co.—There are 19 claims in this group, on the north side of Pritchard creek, near Murray. The company is composed of New York men, Morris H. Hayman, of 149 Broadway, New York City, being president. J. G. Forrester, formerly of Utah, is manager. There are three parallel veins in a slate formation. The upper workings are entered through adit levels. A shaft, now down 360 ft., is being sunk from the lowest level. A still lower adit, now in 1,200 ft., will be driven 1,000 ft. further, and it will cut the shaft at its 600-ft. level. The mine has been worked 18 or 19 years, and is said to have produced about $7,000,000. A 20-stamp mill, now operating, is equipped with amalgamating plates and Wilfley tables, handling 45 tons of ore daily. The ore carries free gold and sulphurets, 66 per cent. of the total mill saving being on the plates, while the concentrate nets $50 per ton. Mr. Forrester states that the recovery is from 87% to 92% of the assay value, and that experiments are being made with cyanide on the concentrates. The mill and air compressor are operated by water power.

Snyder-Wood Mining Co.—This company has four claims 2 miles from Murray, Messrs. Wash. Snyder and J. R. Wood, of Murray, being the principal owners. The vein is opened through crosscuts, and 600 ft. of drifting, all showing high-grade lead-silver ore. One carload of ore shipped recently gave returns of 85% lead and 10.5 oz. silver to the ton.

INDIANA.

(From Our Special Correspondent.)

Clay Mining & Manufacturing.—State Geologist Blachley is engaged on a new report on clay. The last clay report was made in 1895, and since that time Mr. Blachley states the clay mining and manufacturing industries of Indiana have practically trebled. Over $6,000,000 of clay products were produced in Indiana last year.

GREEN COUNTY.

Bloomfield Coal Mining Co.—This company, composed entirely of Bloomfield business men, has been organized to operate and invest in coal lands, coal mining and coal mining machinery. The president is W. L. Cavins and the secretary-treasurer W. T. Brown. The company, through F. M. Dugger, has purchased of the Cabel & Kaughman Co. heirs all of the machinery, track, ties, mules, buildings and equipments used in three mines near Washington.

SULLIVAN COUNTY.

(From Our Special Correspondent.)

The trouble at the coal mines over the basis of pay has been settled by the operators agreeing to pay 85c. a ton for screened coal. The dispute involved 500 miners at the Jackson Hill and Star City mines. The men claimed the option to be paid for screened coal instead of mine-run. They did not object to the mine-run basis, for coal sold as mine-run, but contended that if sold as screened, they were entitled to the higher price.

VIGO COUNTY.

The sale is reported of 1,300 acres located southeast of Farmersburg for $135,025, by David L. Cummings and wife to the Cummings Coal Co. A number of other sales have been made. Shafts are being sunk by the Cummings Coal Co. and the equipment will be modern. By July 1 it is thought the company may be mining coal.

MICHIGAN.

IRON—GOGEBIC RANGE.

Colby.—From this mine at Bessemer some ore has been shipped. The mine at present has only one shaft, which is connected with that on the Yale property adjoining, but it is expected that an additional shaft will be started this summer.

IRON—MENOMINEE RANGE.

Baltic.—At this mine in the Iron River district, of which the Lackawanna Steel Co. is part owner, development will be pushed this year and it will ship heavily. The mine, which has always been an underground property, was stripped during the past winter and the miners will now attack the old pillars on the upper levels.

Bristol.—This mine at Crystal Falls is again full-handed.

Hemlock.—It is reported that this mine at Amasa may be worked to its full capacity this summer.

Tobin.—This mine at Crystal Falls is working full blast, and ore is being loaded from the Crystal Falls stock pile.

MINNESOTA.

IRON—MESABI RANGE.

(From Our Special Correspondent.)

Biwabik Mining Co.—This company is erecting a machine shop and boiler shop, the combined floor space of which is 12,000 sq. ft. It will equip them with new and modern tools and will have every facility for repairing shovels and locomotives. The buildings will be fireproof.

Interstate Iron Co.—Shaft "A" at Lincoln, Virginia, is closed on account of damage to the machinery, but will resume this week. This mine should produce about 350,000 tons this year, and will be the most active in the group at that place. A steam shovel is handling the stockpile and ore is going forward rapidly.

Jordan.—This mine is being pumped out and will resume mining shortly. It is a small property, but secures its ore at low cost.

Kinney.—This mine, the largest property of the Republic Iron & Steel Co., which opened a few weeks ago for the season, has been closed indefinitely. This leaves no mines of this company operating except its Virginia group of underground properties on the Mesabi, and its Cambria and Lillie, on the Marquette range.

Mahoning Ore & Steel Co.—This company has a schedule of 700,000 tons for the year, and will be forced to make an output of 125,000 tons a month from now out. It has shipped but two cargoes so far and is now beginning to move ore rapidly forward.

MONTANA.

BROADWATER COUNTY.

Edward F. Mining Co.—At this company's mine near Hassel a mill will be erected.

DEERLODGE COUNTY.

Moonlight.—This mine at Anaconda is to have a modern surface plant, including a steel gallows frame, a new air compressor and other machinery.

FLATHEAD COUNTY.

Callahan Creek.—An 8-ft. ledge of copper is reported uncovered at this place, 18 miles southeast of Troy.

Homestake Group.—The Homestake Mining & Development Co., composed of Spokane and Eastern people, has taken up its bond on this group of seven claims, near Libby. The amount of the deal is said to be about $25,000.

GRANITE COUNTY.

Gold Reef.—A 20-stamp mill will be erected at this mine, at Philipsburg, this summer.

JEFFERSON COUNTY.

Columbia Group.—This group of claims 5 miles south of Whitehall has been leased and bonded to Capt. W. Thompson and J. N. Trerise. Development work has already begun.

LEWIS & CLARKE COUNTY.

Ajax Mining Co.—In a suit brought by Otis R. Allen to prevent the stockholders selling this property to the National Gas Co., the Supreme Court pronounced valid the law providing that the directors of any mining corporation organized under laws of either the territory or state of Montana, whether the company is insolvent or a going corporation, shall have the power, and, upon the request of stockholders representing at least one-half of the outstanding capital stock, it shall be their duty to call a meeting of stockholders for the purpose of considering the question of selling, leasing, mortgaging, exchanging or disposing of the whole or part of the property of the corporation for other property or the whole or part of the capital stock of any other corporation, and that they shall be bound by the result.

PARK COUNTY.

Ethel May Gold Mining Syndicate.—This English syndicate owns a large number of mines in Emigrant gulch and has completed arrangements to erect a large stamp mill on several of the properties at once. H. B. Edwards is managing engineer.

Wing Placers.—It is reported that these placers in the Emigrant gulch district will be worked on an extensive scale this summer.

SILVERBOW COUNTY.

Way Up.—This mine in the Soap gulch district, near Melrose, has been leased and bonded to a Butte man for one year. The bond is for $10,000.

NEVADA.

EUREKA COUNTY.

Cambrian.—At this mine in the Cortez district, ore running as high as 8,674 oz. silver, with a trace of lead, is reported.

LINCOLN COUNTY.

Fetterman.—The tunnel at this mine at Caliente, is reported to have cut a strong ledge of free gold.

NEW MEXICO.

RIO ARRIBA COUNTY.

Buckhorn.—An option on this claim in Eureka gulch has been taken by A. E. Young and T. Beresford, of Colorado.

Ten Better.—A one-fourth interest in this group in Hopewell has been sold to John Reynolds.

VALENCIA COUNTY.

Gold Lode Tunnel Co.—A strike of good ore is reported at this company's mine at Copperton.

PENNSYLVANIA.

Pine Brook Colliery.—Mining has been resumed at this colliery, although the new breaker will not be completed until fall. At present about 150 hands are employed and about 30 chambers are in operation. The new breaker will have a steel tower 150 ft. high.

Pittsburg Coal Co.—The Dravosburg mines of this company have been shut down, affecting about 300 men. The company recently issued orders to start 8 big mines which have been idle for some time. Four of the mines are on the Panhandle, three are on the Pittsburg & Lake Erie and one is on the Baltimore & Ohio.

Pittsburg & Eastern Coal Co.—Contracts have been awarded for the material for building the new power house, mine offices and tipples of this company, which is opening three large shaft mines into the lower Pittsburg seam coal at Burgettstown.

SOUTH DAKOTA.

CUSTER COUNTY.

(*From Our Special Correspondent.*)

Black Hills & Duluth Copper Mining Co.—At the annual meeting of this company at Custer these directors were elected: F. A. Towner, M. J. Bailey, W. F. Hanley, E. A. Dickson, W. A. Nelson, Louis Knowles, F. A. Gira, R. W. Calkins, W. E. Benedict. The officers are: F. A. Towner, president; W. A. Nelson, vice-president; M. J. Bailey, secretary; W. F. Hanley, treasurer. The company is developing a copper property 8 miles northwest of Custer.

Extreme Mining Co.—Two hundred tons of ore have been run through the 10-stamp mill of this company west of Custer.

Ruberta Mining Co.—The old Four-Mile stamp mill is being removed from this mine to this company's property.

LAWRENCE COUNTY.

(*From Our Special Correspondent.*)

Echo Gold Mining Co.—At the annual meeting of this company these officers were elected: John P. Thorndyke, Grafton, N. H., president; Urias Hardy, Methuen, Mass., vice-president; W. C. Tilletson, Rockerville, Conn., secretary; O. U. Pryve, Deadwood, assistant secretary; Major A. J. Simmons, Deadwood, general manager. The company's property is in Elkhorn gulch, near the Alexander-Maitland mine. A tunnel has been run 300 ft.

Hidden Fortune Co.—At a meeting of this company at Denver H. J. Mayham resigned as president and Herbert S. Shaw was elected. Some land settlements were made with the Homestake company, a number of claims having been held jointly.

Horseshoe Mining Co.—At the annual meeting of this company, held at Beulah, Wyo., the following directors were elected: E. B. Alsop, M. W. Watson, R. W. Binns, R. T. McCready, F. P. Sproul, F. M. Cavitt, John Hussey, E. H. Binns and W. L. McLaughlin. The affairs of the company are reported to be in excellent condition.

PENNINGTON COUNTY.

(*From Our Special Correspondent.*)

Custer Peak Mining Co.—A steam hoist is to be installed at the main shaft at Custer Peak. The building is erected. John O'Brien, of Custer Peak, is superintendent.

UTAH.

(*From Our Special Correspondent.*)

Ore and Bullion Settlements.—Salt Lake banks reported settlements to the amount of $390,500 during the fiscal week ending June 17.

JUAB COUNTY.

(*From Our Special Correspondent.*)

Tintic Ore Shipments.—During the week ending June 17, shipments aggregated 116 carloads, the contributors being: Ajax, 1; Bullion-Beck, 2; Carisa, 3; Centennial-Eureka, 46; Eagle & Blue Bell, 1; Gemini, 13; Grand Central, 21; Lower Mammoth, 1; Mammoth, 8; Salvator, 2; Tetro, 3; Uncle Sam, 1; Uncle Sam (concentrados), 6; Victor Consolidated, 1; Yankee Consolidated, 7.

Uncle Sam Consolidated.—This company is shipping ore worth about $10,000 monthly.

SALT LAKE COUNTY.

(*From Our Special Correspondent.*)

Alta-Quincy.—This property is soon to be equipped with machine drills.

Bingham Consolidated Smelter.—The management has placed an order for the fifth copper furnace, to cost about $20,000. The capacity of the plant will be increased 200 tons a day. The shipments of copper bullion during the week ending June 17 aggregated 283,816 pounds.

United States Smelter.—The shipments of copper bullion during the week ending June 17 aggregated 257,135 pounds.

Utah Consolidated Smelter.—The additional equipment, which has cost about $250,000, will go into commission at once. The daily tonnage will be raised from 500 to 800. The shipments of copper bullion during the week ending June 17 aggregated 305,199 pounds.

SUMMIT COUNTY.

Park City Shipments.—For the week the shipments aggregated 5,001,680 lb., as follows: Silver King, 1,760,680; Ontario, 636,000; Daly-West, 2,443,000; Keith-Kearns, 123,000.

Daly-West.—A good strike is reported on the 400-ft. level, in Quincy ground. On the 900-ft. level another good find has been made.

Ontario.—The mill is treating about 125 tons of ore daily. At the mine the working force has been increased and some good bodies of milling ore have been developed.

TOOELE COUNTY.

Bingham West Dip.—A new compressor plant is being installed.

Ophir Hill.—This property has resumed operations after a shut-down of about a month.

Overland.—Repairs on this company's mill are being made, and the plant will be ready for commission about July 1.

WASHINGTON.

FERRY COUNTY

(*From Our Special Correspondent.*)

Faithful-Surprise.—This mine is near Danville, 5 miles south of Grand Forks. It belongs to J. Jaskulek, B. Campbell, George A. Petty and others, Mr. Campbell being in charge. The gangue consists of serpentine and quartz, carrying gold in iron sulphide. The values are said to run from $17 to $20 to the ton. The ore runs as high as 79% silica and 6% to 7% iron. It is being opened by adits ,and is near the Great Northern's Republic road.

Hercules.—This mine, near Danville, belongs, like the Minnehaha, to Houghton-Thurston Co., of Boston, and associates, and is being developed under the same management. Some ore taken out is said to have run $76 per ton in gold and copper. It can.e from a narrow shoot.

Minnehaha.—This mine, near Danville, belongs to the Minnehaha Copper Gold Mining Co., of Boston. Ernest C. Wood, of Spokane, is consulting engineer, and S. L. Boyer, of Danville, is in charge. It has been developed by a 225 ft. incline, with levels in ore. Some shipments made to the Granby smelter gave net returns of $250 to $400 per car. A long crosscut has been started to intersect the vein at 600 ft. depth. The ore consists of a copper-iron sulphide, running $4 to $12 gold, 4% to 15% copper, with an excess of iron. It is stated that ore worth $10 per ton can be mined and shipped at a profit.

FOREIGN MINING NEWS.

CANADA.

BRITISH COLUMBIA.

Montreal & Boston Consol. Mining & Smelting Co.—This company has been incorporated in Canada, an underwriting syndicate, including New York bankers, taking $5,000,000 of the $6,500,000 stock issued, turning over as consideration most of the stock of several British Columbia mines. The syndicate includes Vice-President Loomis, of the National City bank, of New York; A. B. Leach, Munroe & Munroe, and F. P. Ward, of Philadelphia.

BRITISH COLUMBIA—NELSON DISTRICT.

(*From Our Special Correspondent.*)

Athabaska and Venus.—This group, near Nelson, is under the management of A. H. Gracey, of Nelson. The property is equipped with a 10-stamp mill and cyanide plant, which have been operating since November, 1902. The ore is quite free-milling, 60% to 70% of the saving being on the plates, and 22% to 24% by cyanide treatment. For the last 7 months of 1903 the total extraction amounted to 92.3% of all values. The ore is conveyed from two separate sections of the group by two separate aerial tramways. Three tons to the stamp are crushed daily. Following amalgamation the sand and slime are separated, only the sand being cyanided. The slime is passed over Frue vanners. A slime plant will be erected this season, providing for treatment by agitation and decantation. The ore as it comes from the mines runs $15 to $20 per ton.

Hall Mines Smelting Co., Ltd.—This company's plant is at Nelson. J. J. Campbell is business manager, and R. R. Hedley manager of the smelter. The plant is equipped with two lead furnaces, and mechanical and hand roasters. The bullion is refined at the Trail plant, and at San Francisco. The lead matte run off at the top is re-smelted. The ore supply for the plant is drawn from the Silver King mine, near Nelson, which this company owns; the Emma mine, near Eholt, in which this company has an interest; from the various mines at Ymir, and in East Kootenay, Slocan, Lardeau and also from Washington points. The company will now get 200 tons daily from the Hunter V. mine, near Ymir, of which Mr. Campbell is managing director. The Hunter V. supplies a silicious lime ore, carrying gold and silver. It is said to have an ore-body 80 ft. wide. The ore carries some gray copper and native silver. A long tramway conveys the ore from the mine to the Great Northern Railroad track at Ymir. A. D. Wheeler is in charge of mine work.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

(*From Our Special Correspondent.*)

Jumbo.—This mine is situated at Rossland, and belongs to the Jumbo Gold Mining Co., Ltd., of Spokane. John A. Finch is president, R. Galusha, vice-president and manager. The ore comprises pyrite and pyrrhotite with some sylvanite, and averages 28% iron, 34% silica, 15% sulphur, with $12 gold per ton. The work done shows an ore-shoot 180 ft. long and over 50 ft. wide. A main adit opens the ore-body at 165 ft. depth. Three other levels are being driven below the main adit, but they have not intersected the ore. The lowest of these will give a depth on the ore of 600 ft. The ore produced is mined in development and amounts to 1,200 tons per month. The Great Northern Railroad Company will build a spur to the property. An air compressor

has been ordered. This is said to be the only mine in the district producing sylvanite.

ONTARIO—THUNDER BAY DISTRICT.

Black Bay Mining Co.—This company, which was operating last year a copper prospect east of Port Arthur, is to put on diamond drills and test the formation. A shaft has been sunk 127 ft., cutting an amygdaloid vein 10 ft. thick carrying native copper. The drills will be used to find if this vein is persistent on its strike and dip.

MINING STOCKS.

(Full quotations given on pages 1029 and 1030)

New York. June 22.

Interest has been slightly revived in the stock market, but outside buying is still limited, although prices have improved fractionally. Amalgamated Copper on small sales rose from $49.375 to $50.75, and then receded a half point. Anaconda reappeared at $18.50 @$18.625, and showed sales of a few hundred shares. Greene Consolidated, of Mexico, attracted little attention, selling at $14.75@ $15.125. British Columbia brought $1.75.

The first sale of Homestake, of South Dakota, in a long while, has been made this week at $54, which will yield over 5.5% in dividends annually.

The Colorado stocks are slowly recovering. Portland, of Cripple Creek, sold at $1.60@ $1.65, and Elkton at 68@67c.

The Comstock stocks have sagged. Ophir has fallen to $3.80, while Consolidated California & Virginia moved at $1.30, Mexican at $1.25, and Caledonia at 73c. Knowledge of July has cautioned investors to avoid the Comeight assessments levied for this month and stock group for the present.

Auction sales recently included 25,000 shares McKinley Gold Mining and Milling Co., at $11 for the lot; 30 shares Ohio Mining Co., at $5 for lot, and 32,674 shares Buckeye Iron Mining Co., $8 lot.

Boston. June 21.

(From Our Special Correspondent.)

The past few days have seen more buoyancy in the copper share list than for a very long time and without any material and from Amalgamated. The feature has been Utah Consolidated, which touched $39.75 on large tradings. It is believed that the next dividend will be $2, against $1.50 semi-annually now. It is rumored that the Amalgamated company will take the Utah Consolidated over and $50 per share is freely predicted for it.

Copper Range Consolidated advanced $1 to $43.875 and United States has also been active and strong, being up $1.125 to $21.125 in anticipation the early declaration of a 50c. dividend. Gross earnings of the United States company for May were $290,000 and the net is estimated at $110,000.

Tamarack was very erratic to-day, breaking from $92.50 to $85, up to $94 and back again to $87.50, with the final $91, on doubt of the half-yearly dividend. Osceola is up $3 to $62.50 for the week, and Parrot is higher at $25.50. Mohawk rose almost $2 to $41.875, reacting a fraction, and Wolverine is up $1 to $73. Shannon has been weak again, touching $5.50 to-day on reported inside selling. Bingham has displayed some activity, touching $21.625, while Centennial is off to $19.75. Isle Royale is firm around $8, and Old Dominion at $13.75. Trinity is selling at $3,875. A recent shipment of ore from this mine showed 7.29% copper.

Colorado Springs. June 17.

(From Our Special Correspondent.)

Trading in Cripple Creek shares has increased and a healthy tone prevails. Practically all the mines with the exception of the Portland are now in operation and from a labor standpoint the affairs in camp seem to be in better condition than for some time past. El Paso sold to-day up to 86¼c., a gain of about 1¼c. over last week. Elkton gained nearly 3c., selling to-day at 69½c. Portland closed at $1.67½.

Salt Lake City. June 18.

(From Our Special Correspondent.)

The week closes with an improvement in the mining stock market. During the week the Tonopah-Belmont, Tonopah-Midway, Tonopah Extension, Jim Butler, Tonopah and McNamara stocks were listed. Some trading was done in these stocks and Montana-Tonopah sold up to $2.13. Another newly listed stock is Victoria in the Tintic district. Mammoth will appear in the dividend column again in July, and the company is now said to be entirely free from debt. This caused some inquiry for the stock which sold up to $1.11. Uncle Sam Consolidated improved somewhat, but lost ground again toward the close of the week. Sacramento, Connecticut, Mercur and Tetro were left about where they started a week ago. The Horn Silver Company has announced another dividend of $20,000, payable June 30.

San Francisco. June 16.

(From Our Special Correspondent.)

Burdened by another batch of assessments, the Comstock stocks are without inquiry. Ophir, after touching $3.90, recovered to $4 on limited trading. Other quotations noted are: Consolidated California & Virginia, $1.25 @$1.30; Mexican, $1.20@$1.25, and Caledonia, 69@70c. per share.

The sworn statements of the mining companies, as filed in their offices this week, show cash on hand June 1 as follows, with all expenses paid unless otherwise noted: Alta, $78, with liabilities of $4,781; Andes, $636, with indebtedness of $1,500; Alpha, $3,242; Belcher, $5,220; Best & Belcher, $1,311; Bullion, $547; Caledonia, $9,419, with May expenses at the mine unpaid; Chollar, $920; Consolidated California & Virginia, $29,148; Crown Point, $6,457; Consolidated Imperial, $1,209; Challenge Consolidated, $432; Consolidated New York, $1,079; Confidence, $2,760; Exchequer, $1,026; Gould & Curry, $4,791, with bills receivable of $390; Hale & Norcross, $5,869; Julia Consolidated, $1,358; Justice, $4,126; Mexican, $3,717; Ophir, $111,804, with 16 cars of ore in transit; Overman, $3,936; Potosi, $782; Savage, $76, with indebtedness of $1,750; Segregated Belcher & Mides, $530; Silver Hill, $6,378; Sierra Nevada, $6,756; Scorpion, $2,994; Standard Consolidated, $99,053, with May expenses and bullion clean-up to be accounted for; Syndicate, $2,659; Union Consolidated, $5,267; Utah Consolidated, $3,239.

Assessments are being collected by the following companies: Andes, 10c.; Best & Belcher, 10c.; Bullion, 5c.; Caledonia, 15c.; Chollar, 10c.; Challenge Consolidated, 10c.; Hale & Norcross, 10c.; Mexican, 15c.; Sierra Nevada, 10c.; Utah Consolidated, 10c. per share.

Tonopah shares were in little request, and the same may be said of the oil list.

Monterey. June 14.

(From Our Special Correspondent.)

Exchange on New York has dropped from 216.75 to 214.75.

In mining stocks, in El Oro district, Dos Estrellas brought as high as $2220; Victoria, $63; Rosario y Anexas, $27; Aldebaran, $57; Borda Antigua, $45; Reforma, $19; Antares, $3, and La Union, $65. In San Luis Potosi the Trinidad Charcas sold at $10; La Paz, Matehuala, $170, and Barreno, $65; Augustias, Pozos, Guanajuato, $40, and Cinco Senores, $40. In Pachuca, San Felipe de Jesus brought $16; La Blanca, $400; San Rafael, $742 for free and $720 for assessible; Santa Gertrudis, $81.50; Soledad, $740, and Bartolome, $95.

COAL TRADE REVIEW.

New York, June 22.

ANTHRACITE.

The general condition of the anthracite trade shows little change, except that now the removal of the embargo on lake shipments has resulted in the starting of a heavy tonnage westward. Retail buying all over the country is naturally light, and is not expected to show improvement until the cool weather comes, but the amount of coal moved from the mines in June will undoubtedly be heavy, perhaps as large as the May tonnage, though this is doubtful in view of the lessening demand in the East.

At upper lake ports coal is beginning to arrive by lake pretty freely, and the movement to inland points is active, dealers trying to get advantage of the June discount. In Chicago territory also arrivals of lake coal are heavy, and the demand for it is strong. Few dealers dependent on lake coal were able to get much advantage from the April and May discounts, and now seek to make the most of the June and July discounts. The sizes arriving are pretty well distributed, and there is no shortage of any prepared size, except possibly egg and chestnut. Receipts by rail are falling off. The suspension of lake shipping resulted in an unusually large movement by all-rail, and dealers and consumers dependent on rail shipments are pretty well supplied. Along the lower lakes and in Canadian territory anthracite is still wanted, though the demand is nothing like as urgent as it was. Interest centers on the movement of coal up the lakes. In the line trade farther east and along the Atlantic seaboard the demand, owing to the liberal receipts during May and April, is now declining. At New York harbor points, indeed, the market is approaching dullness, with no prospect of improvement before September. Jobbers are taking what advantage they can of this situation to push sales. The only size that seems at all scarce in the East is stove.

Steam sizes are still selling slowly. The cut of 50c. a ton on pea and buckwheat by the Lehigh Valley Company caused considerable newspaper comment, one yellow journal going so far as to say that the cut signified a serious disagreement among the large producers and presaged the disruption of the 'Coal Trust'—all because of the public-spirited efforts of its editor. As a matter of fact, the Lehigh Valley had on hand a lot of Lehigh coal that it could not sell in competition with Wyoming grades and put this on the bargain counter. The cut did cause some commotion in the trade, but was merely temporary, and the company restored prices on June 18.

BITUMINOUS.

The Atlantic seaboard bituminous trade continues quiet and dull, with small prospects of any immediate change; though the suspension of shipments by many small concerns which find themselves unable to make money at present prices is likely to have some effect before long. It is reported that some Clearfield grades have sold at $2, f. o. b. New York harbor shipping ports during the week. It is scarcely possible that at these figures the producer got back a new dollar for an old one. The proposal of a reduction in miners' wages at certain points, which was discussed more or less a week or two ago, seems now to have been temporarily dropped.

In the far East the demand for coal is confined to shipments on contract orders, and even this demand is falling off. Along Long Island Sound the market continues very quiet, with consumers indifferent. At New York harbor points plenty of coal is arriving, and as railroads are rather strict about coal standing at tidewater, some of this tonnage has been sold at bargain prices. In the all-rail trade the market is possibly a little better, but there is no eagerness among buyers. The movement of coal from mines to tidewater continues prompt, while car supply at the mines is up to all demands of producers, except where curtailed on account of coal standing at tidewater. In the coastwise vessel market freight rates are weak, and are expected to decline. They continue nominally on the basis of last week, 75c. from Philadelphia to Sound points and 85c. to Boston.

Birmingham. June 20.

(From Our Special Correspondent.)

The production of coal continues heavy as there are fears that the United Mine Workers of America, representing about three-fourths of the mine operatives in Alabama, will suspend work on July 1 on account of the expiration of the wage scale. The miners dur-

ing the week held their convention and adopted a wage scale to be presented to the operators this week. It is said that the operators have no organization and therefore will not meet with the miners this week in joint conference, though they are willing to conduct individual negotiations. It is learned that there is but little change in the demands for the new contract, except that a three year contract is desired in place of an annual one, and a few minor readjustments of rules governing mining.

There has been much stocking of coal. Several of the larger consumers have a supply which will last them several weeks.

The railroads have a good supply of coal already, every bin and hold being filled. Considerable coal is mined by non-union and convict labor in this State, and the output of this will not be interfered with if the United Mine Workers go out on strike. Considerable coke has been stacked up against any emergency.

Chicago. June 20.

(From Our Special Correspondent.)

With the settlement of the masters' strike the movement of anthracite to Lake Michigan ports has begun, but the shortage is large and probably cannot be made up, under the best conditions, before September or October. This will make the general distribution of anthracite in lake territory late, and the orders that have been holding back doubtless will increase rapidly. There has already been a substantial increase over the previous week's record. Dealers look for an active season until the beginning of winter. No fears of a shortage that will seriously inconvenience the public or the trade are expressed by the large dealers, but it is generally realized that there are likely to be drawbacks to lake traffic which may reduce the dock stores for the winter materially. Up to July 1 last year 879,964 tons were received in Chicago by lake, whereas this year not more than 70,000 to 80,000 tons are probable. The all-rail trade, therefore, is likely to be of more than usual importance throughout the rest of this season and there may be a stimulation of bituminous business in consequence of the anthracite shortage.

Sales of bituminous still lack activity, both for western and eastern coals. To all appearances, Chicago territory is receiving too much bituminous and demoralization will continue until the receipts are materially lessened. The demand seems to be about normal. Illinois and Indiana continue to bring $1.75@2.25 for lump and prepared sizes generally, though as low as $1.50 is recorded on some sales. Western run-of-mine brings $1.30@$1.75 and is being bought instead of screenings, by many former purchasers of screenings. Hocking is in fairly steady demand at $2.85@$3.10. Smokeless shipments apparently are being curtailed and in consequence the market is a little healthier. Pocahontas and New river are holding close to the $3 mark. There is little sale for gas coals.

Cleveland. June 21.

(From Our Special Correspondent.)

The lake coal situation has taken on an appearance of life through the opening of navigation by the strike being called off. The sales agents of companies shipping coal up the lakes have returned to Cleveland reporting heavy sales of coal for the northwest during this season, that the prices had been satisfactory and that the demand would require a tonnage equal to last year's shipments. Dock and railroad conditions also promise a free movement and the season opens with good prospects. The lake rates are good, shippers paying without dispute 40c. to Lake Superior and 50c. to Milwaukee.

The demand for steam coal in this territory is not on the mend. Factories are inclined to close down to regulate their outputs to market needs. This has caused a certain lessening of the demand for coal. Prices, however, have not weakened much. It is assumed now that the bottom has about been reached with Pittsburg and Ohio coals selling at 95c. at the mines and in some instances at 90c. The best demand is for slack, which is bringing about 55c.@65c. at the mines and is scarce at those figures. The coke situation has not changed, being easy at $2.25 for 72-hour foundry coke and $1.50 for furnace coke.

Pittsburg. June 21.

(From Our Special Correspondent.)

Coal.—The Pittsburg Terminal Railroad & Coal Co., which is operating seven large new mines in this district, is now an active competitor of the Pittsburg Coal Co. for the lake trade. It has booked contracts so far for 1,000,000 tons and during the past week shipped 200 cars daily to Cleveland, Ashtabula Harbor and Lorain docks and expects to increase the number this week to 300 cars daily. The Pittsburg Coal Co. is shipping about 1,000 cars daily. About 90% of the railroad coal mines in the Pittsburg district are in operation and the prospects are for a steady run. Prices remain unchanged on a basis of $1.10 for run-of-mine coal at the mine.

Connellsville Coke.—Trade is depressing and over 1,000 additional ovens have been blown out. The production last week was reduced nearly 20,000 tons and shipments fell off over 500 cars. Prices remain about the same, $1.40 @$1.50 for furnace and $1.80@$2 for foundry coke of the standard Connellsville coke. The production last week amounted to 188,983 tons, a decrease of 19,848 tons compared with the previous week. The shipments aggregated 7,880 cars, a decrease of 579 cars, distributed as follows: To Pittsburg and river points, 3,140 cars; to points west of Pittsburg, 3,645 cars; to points east of Everson, 1,095 cars.

San Francisco. June 15.

(From Our Special Correspondent.)

The coal trade continues quiet. Pacific coast coals in large lots to dealers are quoted as follows: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky Mountain coals, ex-car, to dealers, prices are $14 for Colorado anthracite, $11.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside. Eastern coal is nominal at $14 for Pennsylvania anthracite and $13 for Cumberland. Foreign coal in cargo lots is quoted at $13 for Welsh anthracite, $8.50 for cannel and $7.50 for Wallsend and Brymbo.

J. W. Harrison's circular states that since the ***Sonoma*** **left** there have been no arrivals of coal from any Australian ports, yet singular to say there is no apparent urgent requirement for Colonial coal, although there is no excessive amount here in yard. There are four cargoes fully due to arrive from Australia with about 8,000 tons, but as the coal on each of these vessels is specially adapted for domestic purposes, it is not in immediate demand as the sales for household purposes at this season are light. There are 41 vessels on the engaged list for carrying coal from Australia, their aggregate carrying capacity will be about 105,000 tons. As about 75% of this coal will not arrive for several months hence, it will probably come to a fairly profitable market, as it is exclusively a household fuel. Steam coals from Australia are liable to come to an unprofitable market for several months, as they compete with British Columbia and Washington coals which are being landed here at prices which will prevent profits on Australian coal. Prices remain unchanged, although slight concessions are made for round lots. The volume of business is extremely light. The present asking rates of freight on grain carriers are exceedingly low, with a dismal outlook for any improvement in the near future, this will not prove very seductive to coal carriers from Australia.

Foreign Coal Trade. June 22.

The search for export business continues active, the domestic markets being so dull. Ocean freight rates are a little firmer, but charters are limited.

Messrs. Hull, Blyth & Co., of London and Cardiff, under date of June 11, report that the Welsh coal market is dull and weak throughout. Monmouthshires are comparatively better Quotations are: Best Welsh steam coal, $3.96; seconds, $3.84; thirds, $3.72; dry coals, $3.72; best Monmouthshire, $3.48; seconds, $3.42; best small steam coal, $1.98; seconds, $1.86; other sorts, $1.68.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, both exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½% discount.

Freight rates from Welsh ports, as a whole, are steady, but orders are few and tonnage is slightly in excess. Quotations are: Marseilles, $1.25; Genoa, $1.35; Naples $1.20; Las Palmas, $1.50; St. Vincent, $1.62; Rio, $2.10; Santos, $2.16; Buenos Ayres, $1.74.

Exports of fuel from Great Britain for the five months ending May 31 were, in long tons:

	1903.	1904.	Changes.
Coal	18,046,133	18,360,879	I. 314,746
Coke	262,586	268,412	I. 5,826
Briquettes	351,291	534,019	I. 182,728
Total	18,660,010	19,163,310	I. 503,300

In addition to these exports there were sent abroad for the use of steamships engaged in foreign trade, 6,768,817 tons, which compares with 6,475,244 tons in 1903, showing an increase of 293,573 tons this year.

The exports to the United States were as below:

	1903.	1904.	Changes.
Atlantic ports	1,028,724	21,303	D. 1,007,421
Pacific ports	35,658	55,493	I. 19,835
Total	1,064,382	76,796	D. 987,586

Trade with American is again normal.

IRON TRADE REVIEW.

New York, June 22.

In the iron and steel trades conditions during the week have not improved, and the outlook is for a quiet summer. Southern furnaces continue to turn out and store foundry iron, but in the Pittsburg region, though many inquiries for large tonnages have been received by furnaces, these inquiries have been at such low prices that they have not resulted in business. The cast-iron pipe market continues strong, but on most lines of finished steel and iron prices are being shaded, and considerable cutting is reported from Pittsburg in billets, bars, plates and wire. The price reported last week of $19 for billets, Pittsburg, is confirmed, at least for some orders. In the iron ore trade nothing has been done as yet in the way of season charters for the movement of ore down the lakes, and prices of ore at lower lake docks remain unchanged.

British Iron Trade.—Exports of iron and steel, and manufactures thereof, from Great Britain, for the five months ending May 31, are valued by the Board of Trade returns as follows:

	1903.	1904.	Changes.
Iron and steel.	£12,958,631	£11,563,460	D. £1,395,171
Machinery	7,660,478	8,386,975	I. 726,497
New ships	1,798,068	1,804,798	I. 6,730
Total	£22,417,177	£21,755,233	D. £661,944

Exports of mining machinery, included above, were valued at £380,506, an increase of £90,588 over last year. Nearly half the exports were to South Africa.

The chief items of the iron and steel exports were, in long tons:

	1903.	1904.	Changes.
Pig iron	496,636	358,950	D. 137,686
Bars, rods, etc	48,474	45,865	D. 2,609
Sheets and plates	218,246	220,888	I. 2,642
Rails	281,252	206,902	D. 74,350
Tin-plates	125,686	141,631	I. 15,945

Exports of pig iron to the United States, which were 220,193 tons in 1903, fell to 23,261 tons in 1904. Exports of tin-plate to the

United States increased from 22,570 tons in 1903 to 27,603 tons this year.

Imports of iron and steel into Great Britain for the five months ending May 31 were valued at £3,386,838, against £3,352,431 in the corresponding period of 1903, an increase of £34,407 this year. The chief items of imports this year were 55,442 tons of pig iron; 47,047 tons of wrought bars, rods, etc.; 225,334 tons ingots, blooms and tin-plate bars, and 52.113 tons of structural steel.

Imports of iron ore into Great Britain for the five months were 2,508,321 tons, of which 1,909.414 tons were from Spain; in the five months of 1903, the imports were 2,699,081 tons, of which 2,166,598 tons were from Spain. The total shows a decrease of 190,760 tons this year.

Birmingham. June 20.

(From Our Special Correspondent.)

The Southern pig iron market is quiet, with no improvement. The little spurt noted last week did not hold up and demand has simmered down again. Production is in excess of sales. No intimation is given of a reduction in the output. The quotations are holding fairly firm at $9@$9.25 per ton for No. 2, foundry. The reported sales of No. 2 foundry iron the first part of this month at $9.50 per ton were not large. The quotations are given as follows: No. 1 foundry, $9.50@$9.75; No. 2, $9@$9.25; No. 3, $8.75; No. 4, $8.50@$8.75; gray forge, $8@$8.50; No. 1, soft, $9.75; No. 2, $9@$9.50.

Shipments of iron, cast iron pipe and steel from Southern territory during May were heavy, everything considered. While figures of the Southern Iron Committee are not published, it is learned that they show shipments to have been near 159,000 tons during May. The cast iron pipe shipments from Southern territory amounted to 15,375 tons from Anniston and Birmingham districts; shipments of pig iron, steel billets and steel rails amounted to about 142,912 tons, of which the Birmingham district, including Ensley, shipped nearly 86,000 tons; rail shipments were 6,779 tons. The export movements amounted to 338 tons, of which 134 tons were cast iron pipe.

The sales of pig iron for shipment after July 1 are not large. Some attention is still paid to the export trade; ship room and reasonable freight rates will play a part in any negotiations.

A suspension of work by the coal miners after July 1 will not hurt the iron production for a couple of months at least.

The cast iron pipe trade is very active and heavy shipments are made. It is given out that the plants are shipping as quick as tests can be made and railroad cars loaded. There is no change in the finished iron and steel situation. Machine shops and foundries report conditions unchanged, with room for improvement.

Chicago. June 20.

(From Our Special Correspondent.)

Though the situation in the local pig iron market is no better it is not decidedly worse, and hope is expressed everywhere. Buying continues to be almost wholly in small lots for delivery in 30 to 60 days. Inquiries on large lots for delivery late in the year are increasing, and if largely placed in the coming week will probably cause a decided rise in the market. Prices are about as last week: $12.90@$13.15 for Southern No. 2, and $13.25@$13.50 for Northern No. 2. Southern continues to lead in the volume of sales. The Lenith furnace in Duluth is reported to have sold its output to January 1, about 40,000 tons, to Canadian consumers. Much interest has been caused by the International Harvester Co.'s inquiries for 10,000 to 30,000 tons in the last half of the year; it is felt that this contract closed would help to create an upward tendency.

Coke is still too plentiful and brings about $4.70 for Connellsville, the supply of which is better regulated to consumers' needs than West Virginia, shipments of which should be greatly curtailed.

Cleveland. June 21.

(From Our Special Correspondent.)

Iron Ore.—The market has been steady with no big sales to report. Buyers are still waiting developments. The prices have not shifted from the agreed basis of several weeks past; $3.25 for bessemer old range $3 for bessemer Mesabi. Ships are again running; the rates of carriage have not been fully determined, although they are tacitly. The shippers are paying 70c. from the head of the Lake to Lake Erie ports, and 55c. from Escanaba. Nothing is being done in the way of season chartering, nor is there likely to be for another week. Boats are now carrying material which has not been sold.

Pig Iron.—The market is extremely easy. Furnace owners are beginning to talk of shutting down for a time; probably during July and August. This will not be by any agreement, but the individual owners will act merely for self protection. It is said to be too expensive to pile iron now to think of continuing in operation. An effort will be to cut down costs. The buying of foundry is hand to mouth, no second half covering having started. The buying of bessemer and basic has stopped. Foundry is quoted at $12.25@$12.50 for No. 2.

Finished Material.—The market has shown a slight improvement in the demand for shapes and plates, with a little spurt in buying of bands and hoops and a little better movement in sheets growing evidently out of the fact that prices are getting pretty low. The buying of structural is said to have been the best feature of the market for the week. The trade has shown some indication that building operations are increasing. No contracts have been placed, but current orders are good. Specifications against old contracts have also shown an improvement. Prices hold steady.

The buying of plates indicates a spurt in one of the dullest spots of the whole local situation. The buying has been in small lots but these have been of a better nature. Prices have held steady. The call for bands and hoops has, however, been a feature and prices have been strong, the general quotation being about 1.55c. at the mill. The sheet trade has been inclined to become active at the expense of values. The smaller mills have been cutting the prices of the larger ones and the open market has seen these low prices met. The lowest quotation now is about 2.10c. at the mill in car lots for No. 27. The stock prices have not changed.

The other situations have not changed in the least; the prices on billets and rails is steady on light business and bars are becoming dull through lack of orders. The market as a whole has a downward trend.

Old Material.—There is nothing of importance. Prices have been weak and the buying has been without life. There is a plethora of material and no call for it.

New York. June 22.

Pig Iron.—The market continues quiet, with prices lower on Northern brands. For northern iron we quote: No. 1 X foundry, $15; No. 2 X, $13.75@$14.25; No. 2 plain, $13.75@$14.25; gray forge, $13. For southern iron on dock, prices are about as follows: No. 1 foundry, $13.50; No. 2 foundry, $12.75; No. 3 foundry, $12.50.

Bar Iron and Steel.—There is no change in the market conditions. Refined bars are quoted at 1.495c., in large lots, with steel at the same figure. Common iron bars can be had for 1.35c.

Plates.—The market locally is flat. The Maryland Steel Co., which secured the contract for the Staten Island ferry boats, will get the plates from Harrisburg. Sheared plates are quoted as follows: Tank, 1.25-in. and heavier, 1.75@1.85c.; flange, 1.85@2c.; marine, 1.95@2.10. The coming meeting of plate mill interests is expected to bring developments of importance.

Steel Rails.—Quotations remain $28 for standard sections, f. o. b. mills. Light rails are quoted f. o. b. eastern Pennsylvania mills, as follows: 12-lb., $27; 20-lb., 25-lb., 30-lb., and 35-lb., $25; 40-lb. and 45-lb., $24.

Structural Material.—The market shows little change; demand has possibly improved somewhat. Large lots at tide-water are still quoted nominally at 1.75@2c. for beams, angles and channels. Probably these prices can still be shaded.

Philadelphia. June 22.

(From Our Special Correspondent.)

The pig iron situation is rather disappointing and brokers have little to say. Several of our larger consumers agree that the situation is flat and that there will be very light trading from now on. It cannot be said that competition is sharp because there are no buyers to speak of and the sellers have done what they can do to bring business. It is understood that three or four additional furnaces will soon blow out as the owners after a vigorous canvass have been unable to secure sufficient business to warrant continued operation. Reductions of wages are likely to be attempted and our furnace people are looking for concessions in coke. It was thought that this matter would have been decided upon this week. There is nothing to encourage the piling up of pig iron, and this course will certainly not be pursued. The best quotations to-day are for No. 1 X foundry, $15.25; No. 2 X foundry, $14.75; No. 2 plain, $14; No. 2 Alabama by rail, $13.50@$14. Pennsylvania forge iron, $13.50; basic, $13.75.

Steel Billets.—Until something definite transpires, the users of billets will continue to buy in small lots, which cost them about $24 delivered. Makers have failed to induce some of our larger consumers to place bigger orders.

Merchant Bar.—The re-affirmation of former quotations was to be expected; the margin in bar iron is narrow and the only hope is in lower cost of production. This is not likely to come, although wages for puddling may be reduced 25c. There are some inquiries for basic; buyers are expecting the makers to make better terms. Some malleable iron is coming in and the small mills have been talking about forge.

Sheet Iron.—The retail demand for sheet iron has picked up unexpectedly and the mill men are much encouraged at the amount of business they have done.

Boiler Tubes.—The action of the railroads here in restricting shop activity will have an immediate and pronounced effect upon boiler tubes and certain other products. It is not believed that this restriction will go beyond the railroads.

Cast Iron Pipe.—Our cast iron pipe people are having a busy time and are offered considerable new business for fall delivery, which they are putting themselves in shape to handle.

Iron and Steel Plate.—Until the July meeting of the Plate Association takes place nothing will be done out of the ordinary. The usual quotations are made on the small business done, but in the absence of the big buyers the situation is unsatisfactory. Quotations are 1.78½c. for ¼ in.; flange, 1.88½c.; fire-box steel, 1.98½c.

Structural Material.—The amount of business done in structural material is limited to urgent requirements in our immediate territory. Mill agents do not appear hopeful of any material change during the summer. Quotations range as usual from 1.73½@1.85c., and for small angles, 1.50c.

Steel Rails.—The agents of rail mills give the usual answer that orders are light and that there are no probabilities of heavy orders from eastern railroads.

Scrap.—The market is dull. Two or three yardmen who were anxious to turn scrap into money this week were disheartened in their attempt, especially on machinery scrap and steel scrap. There is no inducement to gather up scrap throughout the country, and a great deal of it is awaiting bids.

Pittsburg. June 21.

(From Our Special Correspondent.)

The iron and steel markets show no improvement. Some business was done during the week but everything indicates a dull summer with fair prospects for a brisk fall trade. Inquiries for pig iron of all grades continue to be received in large numbers, but the prices offered are too low. During the past two weeks one large furnace interest claims to have received inquiries aggregating 160,000 tons. Strict secrecy is maintained regarding sales at unusually low prices and but little definite information as to business of this kind can be obtained. Sales at fair prices are freely made public. One sale given out to-day was for 500 tons of bessemer pig iron, and the price named was $12.15, valley furnace. It is reported, however, that some bessemer iron has sold as low as $11.85, valley. Another sale this week made by a Pittsburg broker calls for 1,000 tons of basic iron for eastern delivery at $10.75, Virginia furnace. This, with freight, is equal to $13.30, Pittsburg. Sales of bessemer have been made at a lower price. The Standard Sanitary Manufacturing Co. is in the market for 9,400 tons of foundry iron, and contracts, it is expected, will be closed this week. Of this tonnage 3,700 is for Louisville works, 1,700 for New Brighton, and 4,000 for Allegheny plant. Three more valley furnaces closed yesterday. They are the Lowellville stack of the Ohio Iron & Steel Co., the stack of the Struthers Furnace Co., and the stack of the Brier Hill Iron & Coal Co. The first of the new blast furnaces at Lorain is completed and is being blown in this week, while other furnaces of the United States Steel Corporation are being blown out. The Ella furnace at West Middlesex and three steel works furnaces at Mingo Junction have been put out of blast within the past few days and a number of others are scheduled to go out in a week or two.

There is a fair amount of business being done in steel and finished products but in most instances the regular price is being shaded, in some cases the cut being from $3 to $4 a ton. Serious cutting is reported in plates, wire products, steel bars and billets. One large sale of bessemer billets is recorded by a local interest this week. It was for 3,000 tons delieverd at Cleveland at $21.50, which would mean a rate of $20.10, Pittsburg, a cut of $2.90 from the association price, and there is no doubt but that some sales are being made at $19, the price rumored last week. The association will meet in New York early next month and there is considerable speculation as to what will be done with prices. It is believed by some that the members will favor either a re-affirmation of the $23 rate or an open market. The American Sheet & Tin Plate Co. has taken a large order for tin plate, according to reports, for delivery in Canada. No wage concession is allowed on export trade as on the rebate business. The report that 25,000 boxes had been sold to a Canadian consumer was not denied by a leading officer of the company, the reply being that the company does not make public its business affairs. The Pressed Steel Car Co. has just closed a contract for 1,500 tons of iron bars. The price is not announced.

The wage conferences of the Amalgamated Association of Iron, Steel & Tin Workers so far have been fruitless. The meeting with the Republic Iron & Steel Co. at Cambridge Springs came to a close without a settlement and no date was fixed for another conference. The company, however, expects to continue the operation of its plants upon the expiration of the present scale of June 30 pending an adjustment of wages by a board of conciliation. The same committee of the workers met representatives of the steel hoop branch of the Carnegie Steel Co., without reaching an agreement. The steel hoop people, it is understood, agreed to pay the demands for the boiling scale on condition that a heavy reduction would be allowed in the finishing scale. The conference on the sheet and tin plate scales opened this afternoon with representatives of the American Sheet & Tin Plate Co. It is not believed a settlement will be reached unless the workers make some concessions from the demands decided on at the Cleveland convention last month. Both the tin plate and sheet scales were cut 18% during the scale year and the workers are asking for a restoration of 8% of this cut.

W. T. Graham, president of the American Sheet & Tin Plate Co., has resigned and will retire on July 31. He will be succeeded by John A. Topping, president of the La Belle Iron Works. Mr. Graham, it is reported, will become president of the American Can Co. Mr. Topping was first vice-president of the American Sheet Steel Co. before it was consolidated with the tin plate interest.

Pig Iron.—There is but little business and prices are largely nominal. Bessemer is quoted at $12@$12.25, valley furnace; foundry No. 2 at $12.75@$13, Pittsburg, and gray forge at $12.40@$12.50, Pittsburg. Many inquiries are being received daily, but only a few sales are recorded.

Steel.—The billet price is till being cut and it is believed as low as $19 can be done. One sale of 3,000 tons of bessemer billets is announced, the price being $21.50 delivered at Cleveland, equivalent to a rate of $20.10, Pittsburg. Plates continue to be quoted at 1.60c., the association price, but it is reported prices are shaded from $3 to $4 a ton. Steel bars continue at 1.35c., but shading is said to be done on most of the new business placed.

Sheets.—The market is unusually quiet this week. The leading producer quotes No. 28 gauge black sheets at 2.20c. and galvanized at 3.20c. It is reported that these prices have been shaded about $2 a ton.

Ferro-Manganese.—The principal producer is still quoting domestic 80% at $41.50.

CHEMICALS AND MINERALS.

New York, June 22.

Little energy is displayed by sales agents, as consumers seem indifferent, anticipating quiet for weeks to come. There is some speculation as to the future supply of Louisiana sulphur, of which a lot of 3,000 tons was recently received at New York for experimental purposes in the East. Heretofore this sulphur has been shipped entirely to the Central Western markets, notably Ohio, where it is claimed the purity of the product has gained favor. It is learned that the company operating the sulphur wells has made a satisfactory arrangement for transportation to eastern markets. The value of the domestic sulphur, frequently 99.95% pure, is based on the Sicilian best unmixed seconds, which are now worth $21.75 for shipment. The output of the Louisiana mines last year is reported as 35,000 tons, but in 1904 the quantity will be considerably larger, as two wells are now pumping from 500 to 700 tons daily.

The Dupont International Powder Co., the dynamite and blasting powder combination, will pay a quarterly dividend of $1.25 per preferred share on July 1. This is at the rate of 5% per annum on the par value of $100.

The production of iodine by 19 nitrate of soda works in Chile in 1903 amounted to 155.5 long tons; exports were 382.5 tons, and stocks on December 31 are calculated at 811 tons. The value of iodine was almost stationary in 1903 at 12c. per oz., and since the close of the year has risen to 15c. in anticipation of a smaller output in Japan.

The foreign trade of Great Britain in the five months ending May 31, is shown below:

	Exports.	Imports.
Bleaching powder, lb.	5,055,856	11,289,488
Borax, lb.	.....	19,889,632
Brimstone, tons.	.....	8,001
Cement, tons	153,729	108,660
Chemical manures, tons.	153,913	.....
Copper sulphate, tons.	54,198	.....
Nitrate of soda, tons.	.....	63,754
Phosphates, tons	.....	183,931
Pyrites, tons	.....	320,492
Salt, tons	242,843	.....
Saltpeter, lb.	.....	12,532,240
Soda ash, lb.	65,328,928	
Soda, bicarb., lb.	14,111,992	
Soda, caustic, lb.	61,560,800	14,183,120
Soda crystals, lb.	8,342,768	
Soda, sulphate, lb.	45,895,568	
Soda, other sorts, lb.	15,195,488	
Sulphuric acid, lb.	6,796,832	.....

Exports generally show a heavy falling off as compared with last year.

Cyanide.—Excepting for a few small exports to Mexico, trade is quiet, and sellers ask 19@20c. per pound.

Bleaching Powder.—Jobbers are active, offering spot supplies at $1.10@$1.15 per 100 lb., but importers continue to ask $1.20@$1.25 for forward contracts.

Copper Sulphate.—The market is quiet at $5.05@$5.10 per 100 pounds.

Acids.—Sulphuric acid is in some request, but other lines are seasonably quiet, and prices continue firm.

We quote as below per 100 lb., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°	$1.50	Oxalic, com'l.	$5.10@$5.50
Muriatic, 20°	1.60	Sulphuric, 50°,	
Muriatic, 22°	1.75	bulk, ton	13.50@14.50
Nitric, 36°	4.50	Sulphuric, 60°,	1.05
Nitric, 38°	4.75	bulk, ton	18.00@20.00
Nitric, 40°	5.00	Sulphuric, 66°,	1.20
Nitric, 42°	5.50	bulk, ton	21.00@23.00

Brimstone.—According to report domestic sulphur has sold at $21.75 per ton, a price that is also quoted on forward shipments of Sicilian best unmixed seconds. There is so little doing that sellers have become indifferent.

Pyrite.—A little business is being done in the South, but up North sales are few. Prices are nominally unchanged.

We quote domestic pyrite $5 per ton for lump ore, f. o. b. Atlantic coast mines, and 9c. per unit for fines; sulphur content varies from 42@44%. Spanish pyrite, carrying from 46@52% sulphur, are quoted at 11@11.5c. per unit for lump, and 9.5@10c. for fines, delivered at Atlantic ports.

Phosphates.—Ocean freights are hardening, and an advance of 6d. all round presages higher prices on future contracts. Momentarily sales are few, but miners expect quite an influx of orders soon, for it is contended that foreign superphosphate manufacturers have not abundant stocks of phosphates. Hope of both parties—the consumer and miner—is centered on an increased consumption of phosphoric acid in this country as well as in Europe.

Exports of Florida high-grade rock from Savannah in May amounted to 10,182 tons, all by the Dutton Phosphate Co., principally for Germany. Since January exports have been 61,254 tons, which compares with 72,989 tons last year, showing a decrease of 11,735 tons in 1904.

Exports of phosphates from Sfax (Tunis) in May amounted to 40,866 metric tons, to France, Italy, Germany, Holland, Sweden, Spain and Great Britain. For the five months this year exports totaled 180,734 tons, which is 67,083 tons more than in 1903.

Phosphates are quoted as follows, per ton:

Phosphates,	F. o. b.	C. i. f. Gt. Britain or Europe.
½Fla. hard rock, 77@80%	$7.25@$7.50	$9.89@11.10
land pebble, 68@73%	3.75& 4.00	6.39@ 8.05
†Tenn. 78@80%	4.00@ 4.25	9.88@10.66
78%	3.75@ 4.00	.....
75%	3.25@ 3.50	.....
73@74%	2.95@ 3.20	.....
‡So. Car. land rock	3.00@ 3.25	.....
river rock, 55@60%	2.75@ 3.00	5.75@ 6.56
Algerian 63@70%	....	6.82@ 7.32
58@63%	....	6.05@ 6.50
53@58%	....	4.95@ 5.00
Tunis (Gafsa)	....	5.75@ 6.50
Christmas Isle, 80@85%	....	11.75@12.54
Ocean Isle, 82@88%	....	12.54@12.98
Somme, Fr., 70@75%	....	10.63@11.02
Bordeaux, Fr., 60@65%	....	7.60@ 7.72
55@60%	....	6.44@ 6.55
Liege, Bel., 60@65%	....	7.00@ 7.10

* F. o. b. Florida or Georgia ports. † F. o. b. Mt. Pleasant. ‡On vessel, Ashley River, S. C.

Nitrate of Soda.—Evidently the market will continue strong for some time to come, primarily because production is expected to fall short

of the consumption. Already producers have raised their prices in anticipation of this situation, and in New York importers ask $2.20@$2.25 per 100 lb. for spot; $2.15 for arrivals, and $2.125@$2.175 for futures, according to position.

Sulphate of Ammonia.—This market is quietly firm at $3.05 per 100 lb. for good gas liquor.

Liverpool. June 8.

(*Special Report of Joseph P. Brunner & Co.*)

The home trade in heavy chemicals is fairly good, but export is dull.

The exports of bleaching materials and soda compounds for the month of May, according to the Board of Trade returns, are as follows: Bleaching materials: To United States, 43,240 cwt.; other countries, 14,322 cwt.; total, 57,562 cwt. Soda ash, 91,420 cwt.; bicarbonate soda, 28,085 cwt.; caustic soda, 103,249 cwt.; soda crystals, 20,313 cwt.; saltcake, 108,893 cwt.; other sorts, 28,014 cwt.; total, 379,974 cwt. As compared with last year, there is a marked falling off in the exports of bleaching materials. The shipments of soda ash and caustic soda have decreased, but exports of saltcake are much heavier than May, 1903.

Soda ash is firm, but without special feature. For tierces, nearest range is about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6 per ton net cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s. per ton net cash. Bags 5s. per ton under price for tierces. Soda crystals find a steady outlet at generally £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda is inactive, but prices are unchanged as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton net cash. Special quotations for export to the Continent and a few other export quarters.

Bleaching powder is neglected, and prices are nominal at £4@£4 10s. per ton net cash for hardwood, as to market.

Chlorate of potash is quietly steady at 2⅞d.@3d. per lb. net cash.

Bicarbonate of soda is selling to a fair extent at £6 15s. per ton, less 2½% for the finest quality in 1 cwt. kegs, with usual allowances for larger packages, also special terms for a few favored markets.

Sulphate of ammonia is steady at about £11 17s. 6d.@£12 per ton, less 2½% for good gray 24@25% in double bags f. o. b. here.

Nitrate of soda is in moderate demand at £10 5s.@£10 10s. per ton, less 2½% for double bags f. o. b. here, as to quality.

METAL MARKET.

New York. June 22.

Gold and Silver Exports and Imports,

At all United States Ports in May and Year.

Metal	May		Year.	
	1903.	1904.	1903.	1904.
Gold:				
Exports.	$14,488,268	$43,071,053	$18,828,853	$46,928,849
Imports.	1,492,845	10,472,512	11,208,501	42,878,021
Excess	E.$13,025,423	E.$32,598,541	E. $7,620,152	E.$24,050,828
Silver:				
Exports.	2,148,412	5,098,013	15,948,929	21,957,065
Imports.	1,612,581	1,943,988	7,930,489	10,983,827
Excess	E. $535,831	E. $3,154,025	E. $8,018,440	E.$10,973,238

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending June 18 and total from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$11,500	$267,275	$630,833	$18,161
1904	63,535,915	3,307,807	19,350,009	397,790
1903	14,978,434	2,969,404	8,291,379	1,034,329
1902	16,495,762	1,209,591	13,533,250	644,464

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending June 18, gives the following totals, comparison being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts	$904,821,100	$1,049,689,800
Deposits	889,779,300	1,122,012,500
Circulation	44,008,800	38,752,800
Specie	158,459,700	236,366,300
Legal tenders	74,084,700	83,006,700
Total reserve	$232,544,400	$319,373,000
Legal requirements	222,444,825	280,503,125
Balance surplus	$10,099,575	$38,869,875

Changes for the week were increases of $7,596,500 in loans and discounts, $12,781,300 in deposits, $4,723,800 in specie, $1,779,000 in legal tenders, $664,800 in circulation and $3,507,475 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison is made with the holdings at the corresponding date last year:

	1903.		1904.	
	Gold.	Silver.	Gold.	Silver.
N. Y. Ass'd	$158,459,700	.....	$236,366,300	.....
England	187,097,865	.....	172,220,385	.....
France	503,175,975	$225,001,690	559,179,315	$226,331,400
Germany	176,130,000	61,885,000	181,865,000	62,400,000
Spain	72,730,000	102,495,000	73,700,000	101,205,000
Netherlands	19,702,000	32,994,500	27,380,500	32,969,000
Belgium	15,083,335	7,541,665	15,303,335	7,651,665
Italy	90,275,000	11,245,500	110,225,000	19,996,500
Russia	388,580,000	44,015,000	424,080,000	40,290,000
Austria	229,005,000	65,900,000	234,935,000	69,985,000

The returns of the Associated Banks of New York are of date of June 18, and the others June 16, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The demand for silver has been good. Arrivals have been readily placed at current rates, and the underlying tone of the market is steady.

The United States Assay Office in New York reports receipts of 62,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to June 9 are reported by Messrs. Pixley & Abell's circular as follows:

	1903.	1904.	Changes.
India	£3,143,525	£5,117,813	I. £1,974,288
China	183,231	126,062	D. 57,169
Straits	206,079	58,103	D. 147,976
Total	£3,532,835	£5,301,978	I. £1,769,143

Receipts for the week this year were £218,000 in bar silver from New York, £4,000 from Chile and £8,000 from Australia; total, £230,000. Shipments were £248,500 in bar silver to Bombay and £50,010 to Calcutta; total, £298,510.

Indian exchange remains at 16d. per rupee, paid for part of the 50 lakhs of council bills offered in London. Gold shipments from Australia are still being made.

The movement of gold and silver in Great Britain for the five months ending May 31 is reported as follows:

Gold:	1903.	1904.	Changes.
Imports	£10,617,316	£13,962,798	I. £3,345,482
Exports	5,824,974	12,815,141	I. 6,990,167
Excess, imp...	£4,792,342	£1,147,657	D. £3,644,685
Silver:			
Imports	3,819,803	5,318,446	I. 1,498,643
Exports	4,452,873	6,092,287	I. 1,639,414
Excess, exp...	£633,070	£773,841	I. £140,771

Of the silver imported this year a total of £3,861,037, or 72.6% of the whole, is credited to the United States.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$0.46	$0.47½
Peruvian soles and Chinese pesos	.40	.43½
Victoria sovereigns	4.86	4.87
Twenty francs	3.86	3.88
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

June.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. Cathodes, Cts. per lb.	Copper. London, £ per ton.	Tin, Cts. per lb.	Lead, Cts. per lb.	Spelter. N. Y., Cts. per lb.	Spelter. St. Louis, Cts. per lb.
16	12¼ @12½	12⅛ @12⅜	11⅞ @12⅛	56⅜	26	4.15 @4.20	4.72½ @4.75	4.55 @4.60
17	12⅛ @12½	12⅛ @12⅜	11⅞ @12⅛	56¾	25⅞	4.15 @4.20	4.72½ @4.75	4.55 @4.60
18	12¼ @12½	12⅛ @12⅜	11⅞ @12⅛	....	25⅞	4.15 @4.20	4.72½ @4.75	4.55 @4.60
20	12⅜ @12½	12¼ @12⅜	12 @12⅛	57	25⅞	4.15 @4.20	4.72½ @4.75	4.55 @4.60
21	12⅜ @12½	12¼ @12⅜	12 @12⅛	56½	25⅝	4.15 @4.20	4.72½ @4.75	4.55 @4.60
22	12⅜ @12½	12¼ @12⅜	12 @12⅛	56⅜	25¾	4.15 @4.20	4.72½ @4.75	4.55 @4.60

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars.

SILVER AND STERLING EXCHANGE.

June.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	June.	Sterling Exchange.	Silver. New York, Cts.	Silver. London, Pence.
16	4.87¼	55⅛	25 5/16	20	4.87¼	55⅛	25 5/16
17	4.87¼	55⅛	25⅜	21	4.87¼	55⅛	25⅜
18	4.87¼	55⅛	25 5/16	22	4.87¼	55⅛	25¼

New York quotations are for fine silver per ounce Troy. London prices are for sterling silver .925 fine.

Copper has been very active indeed throughout the week, and a large business has been done both for home trade and export, for spot as well as future delivery. Early deliveries are beginning to become scarce. The closing quotations are given as 12⅜@12½c. for Lake; 12¼@12⅜c. for electrolytic in cakes, wirebars and ingots, 12@12⅛c. in cathodes; 12@12⅛c. for casting copper.

The market for standard copper in London, which closed last week at £56 15s., opened on Monday at £57, and the closing quotations on Wednesday are given as £56 7s. 6d.@£56 10s. for spot, £56 5s.@£56 7s. 6d. for three months.

Statistics for the first-half of the current month show an increase in the visible supplies of 300 tons.

Refined and manufactured sorts we quote: English tough, £59@£59 5s.; best selected, £60@£60 5s.; strong sheets, £71@£71 5s.; India sheets, £67@£67 5s.; yellow metal, 6⅛d.

Exports of copper from Baltimore for the week ending June 21 are reported by our special correspondent as 625 tons, to Great Britain and Holland.

Imports of copper and copper material into Great Britain for the five months ending May 31 were as below, in long tons, the totals showing the approximate contents in fine copper:

	1903.	1904.	Changes.
Copper ore	35,096	34,941	D. 155
Matte and precipitate	30,704	23,791	D. 6,913
Fine copper	26,533	36,639	I. 10,106
Totals, fine copper	45,395	52,028	I. 6,633
Exports	26,815	23,665	D. 3,150
Net imports	18,580	28,363	I. 9,783

Of the imports this year 21 tons of ore, 2,454 tons of matte, and 19,872 tons of fine copper were from the United States, against 297 tons ore, 1,914 tons matte and 8,988 tons fine copper last year.

Tin has again experienced quite a sharp decline, as low as 25½c. being accepted at one time. At the close there is an improvement

in tone, and the quotations are given as 25¾c. for spot, 25⅝c. for futures.

The foreign market, which closed last week at £118, opened on Monday at £117 12s. 6d., declined on Tuesday to £116 12s. 6d., and the closing quotations on Wednesday are cabled as £116 15s.@£116 17s. 6d. for spot, £116 5s.@£116 7s. 6d. for three months.

Imports of tin into Great Britain for the five months ending May 31, with re-exports of imported tin, were as follows, in long tons:

	1903.	1904.	Changes.
Straits	8,538	10,525	I. 1,987
Australia	1,780	1,647	D. 133
Total imports	11,299	13,399	I. 2,100
Re-exports	9,182	10,899	I. 1,717
Other countries	981	1,227	I. 246
Net imports	2,117	2,500	I. 383

A large part of the tin re-exported is metal in transit to this country.

Lead is quiet but steady without any special feature. The closing quotations are given as 4.15@4.20c. New York, 4.07½@4.12½c. St. Louis.

The foreign market has ruled quiet but firm through the week, the closing quotations being cabled as £11 8s. 9d.@£11 10s. for Spanish lead, £11 11s. 3d.@£11 12s. 6d. for English lead.

Imports and exports of lead in Great Britain for the five months ending May 31, are reported as below, in long tons:

	1903.	1904.	Changes.
United States	15,730	14,149	D. 1,581
Spain	41,277	43,795	I. 2,518
Australia	26,668	28,747	I. 2,079
Other countries	9,446	12,409	I. 2,963
Total imports	93,121	99,100	I. 5,979
Exports	14,162	16,175	I. 2,013
Balance	78,959	82,925	I. 3,966

The lead credited to the United States is principally Mexican metal, refined here in bond.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us as follows: Lead is dull at the late decline, 4.10c. being asked for Missouri brands, and 4.125c. for desilverized.

Spelter.—The dullness prevailing in the iron and steel markets continues to exercise a depressing influence on spelter. Nevertheless, prices have ruled steady at 4.55@4.60c. St. Louis, 4.72½@4.75c. New York.

The foreign market is firm, good ordinaries being quoted at £21 15s.; specials at £22.

Imports and exports of spelter in Great Britain for the five months ending May 31 are reported as below, in long tons:

	1903.	1904.	Changes.
Spelter	36,562	37,276	I. 714
Zinc sheets, etc.	8,999	9,748	I. 749
Total imports	45,561	47,024	I. 1,463
Exports	3,268	3,069	D. 199
Net imports	42,293	43,955	I. 1,662

Imports of zinc ore are not given in the reports.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows: Spelter is steady, with a fair amount of inquiry for both present and future delivery. Latest sales are on a basis of 4.60@4.625c., East St. Louis.

Antimony is dull and neglected. We quote: Cookson's at 7@7⅜c.; Hallett's, 6⅜@6½c.; United States, Italian, French, Japanese, Hungarian and Chinese, 5⅞@6c. per pound.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per pound.

Platinum.—Quotations are nominally $18.50 per ounce, but the tendency is upward, and higher prices are expected.

Platinum in manufactured forms is very firm. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 77c.; crucibles and dishes, 80c.; perforated ware, like cones, etc., 85c. per gram.

Quicksilver.—The New York price is $44.50 @$45 per flask, for large lots, with a slightly higher figure quoted for smaller orders. The San Francisco current price is $43@$43.50 for domestic, and $42.50@$43 for export. The London price is £8 per flask for Spanish, and £7 19s. for Italian.

Imports of quicksilver into Great Britain for the five months ending May 31 were 2,014,798 lbs., against 1,994,246 lbs. in the corresponding period in 1903. Re-exports of foreign quicksilver were 621,411 lbs., against 841,722 lbs. last year.

Cadmium.—Current prices, as reported by Herr Paul Speier, of Breslau, Germany, are as follows: Cadmium, guaranteed, 99.5% metal, in quantities of 500 kg. or over, 700@725 marks per 100 kg., f. o. b. Hamburg, net cash, packing included.

Minor Metals and Alloys.—Thallium is quoted at 60@65 marks per kg., at Breslau, Germany. Manganese metal is quoted 360 marks per 100 kg., f. o. b. Bremen, Germany, Manganese tin alloy, 55% is quoted 365 marks per 100 kg. for first quality, and 225 marks for second quality, both f. o. b. Bremen.

For other minor metals and their alloys, wholesale prices, f. o. b. works, are as follows:

Aluminum	Per lb		Per lb
No. 1, 99% ingots	33@37c.	Ferro-chromium (74%)	12½c.
No. 2, 90% ingots	31@34c.	Ferro-Tungsten (37½)	38c.
Rolled Sheets	4c. up	Magnesium, pure (N. Y.)	60c.
Alum-bronze	20@23c.	Manganese	$2.75
Nickel-alum	33@39c.	Mangan'e Cop. (20% Mn)	32c.
Bismuth	$2.10	Mangan'e Cop. (30% Mn)	38c.
Chromium, pure (N. Y.)	80c.	Molybdenum (Best)	$2.00
Copper, red oxide	50c.	Phosphorus, foreign	45c.
Ferro-Molybde'm (50%)	$1.25	Phosphorus, American	70c.
Ferro-Titanium (10%)	90c.	Sodium metal	50c
Ferro-Titanium (20@25%) N. Y.	55c.	Tungsten (Best)	88c.

Missouri Ore Market.

June 18.

(*From Our Special Correspondent.*)

The highest price paid for zinc ore during the week was $37 per ton for one bin of ore assaying 64% zinc, the ore being sold on an assay basis price of $33 per ton of 60% zinc. A few bins of ore were marketed earlier in the week on a $34 basis, but assaying less did not command so high a price. The basis price was $31@$34 per ton of 60% zinc. A year ago the highest price was $40 and the basis price $35@$37 per ton of 60% zinc.

The district value of the zinc and lead ores marketed during the 25 weeks of this year is over $5,000,000, and though prices have been generally lower the mark was passed two weeks sooner than last year. The shipments for 25 weeks have exceeded last year's same period by 18,794,720 lb. of zinc, and 4,673,700 lb. of lead. The zinc value was $190,979, and the lead value $147,473 greater, the combined value being $337,452 greater than last year.

The output during the week was restricted about 120 tons, and the shipment about 837 tons compared with the previous week, and as the shipment was as large as the output, there was no increase of the reserve stock.

Following are the shipments of zinc and lead from the various camps of the district for the week ending to-day, with the year's totals to date:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	2,551,290	424,700	$49,420
Joplin	2,243,180	376,080	44,735
Galena-Empire	920,180	150,280	17,780
Alba-Neck	920,310	40,500	16,710
Duenweg	579,720	92,350	11,700
Prosperity	380,380	114,120	9,080
Aurora	526,180	11,990	8,050
Granby	410,000	49,000	5,775
Badger	236,030	.....	4,010
Mitchell	177,470	22,630	3,705
Oronogo	227,560	3,080	3,455
Carthage	166,760	.....	2,835
Zincite	130,780	6,390	2,400
Carl Junction	65,410	8,220	1,325
Spurgeon-Spring City	108,470	8,950	1,045
Beef Branch	24,760	39,930	990
Reeds	53,450	.....	855
Stotts City	40,830	.....	695
Totals	9,762,760	1,348,220	$184,565
Twenty-five weeks	253,935,000	31,951,780	$5,087,340

Zinc values, the week, $149,295; 25 weeks, $4,198,685.
Lead value, the week, $35,270; 25 weeks, $888,655.

Average Prices of Metals per lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903	1904.	1903.	1904.	1903.	1904.
Jan...	28.33	28.845	4.025	4.347	4.865	4.863
Feb..	29.43	28.087	4.075	4.375	5.043	4.916
Mar..	30.15	28.317	4.442	4.475	5.349	5.067
April.	29.81	28 132	4.567	4.475	5.550	5.219
May .	29.51	27,718	4.325	4,423	5.639	5.031
June .	28.34	.....	4.210	.....	5.697	.....
July..	27.68	.....	4.075	.....	5.662	.....
Aug..	28.29	.....	4.075	.....	5.725	.....
Sept..	26.77	.....	4.243	.....	5.686	.....
Oct...	25.92	.....	4.375	.....	5.510	.....
Nov..	25.42	.....	4.218	.....	5.388	.....
Dec...	27.41	.....	4.162	.....	4.731	.....
Year	28.09	.....	4.237	.....	5.400	.....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.: February, 4.717c.; March, 4.841c.; April, 5,038c.; May, 4,853c.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan...	12.159	12.410	12.361	12.553	53.52	57.55
Feb...	12.778	12.063	12.901	12.245	57.34	56.57
Mar..	14.416	12.299	14.572	12 551	63 85	57.321
April.	14.454	12.923	14.642	13.120	61.72	58.247
May..	14.435	12,758	14.618	13.000	61.73	57.321
June .	13.942	.....	14.212	.....	57.30	.....
July..	13.094	.....	13.341	.....	56,64	.....
Aug..	12.902	.....	13.159	.....	58.44	.....
Sept..	13.205	.....	13.345	.....	56.82	.....
Oct...	12.801	.....	12.954	.....	55 60	.....
Nov..	12.617	.....	12.813	.....	56.30	.....
Dec. .	11.952	.....	12,084	.....	56.96	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars: prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902.		1903.		1904.	
	London. Pence.	N. Y., Cents.	London Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.
Jan..	25.62	55.56	21.98	47.57	26 423	57.055
Feb..	25.41	55.09	22.11	47.89	26.665	57.592
Mar..	25.00	54.23	22.49	48.72	26.164	56,741
April.	24.34	52.72	23.38	50.56	24 974	54.202
May..	23.71	51.31	24.89	54.11	25.578	55.490
June.	24.17	52.36	24.29	52.86	.....	.....
July..	24.38	52.88	24.86	53.92	.....	.....
Aug..	24.23	52.52	25.63	55.36	.....	.....
Sept..	23.88	51.52	26.75	58.00	.....	.....
Oct...	23.40	50.57	27.89	60.36	.....	.....
Nov..	22.70	49.07	27.01	58.11	.....	.....
Dec...	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53.57	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce. .925 fine.

ASSESSMENTS.

Company.	Delinquent.	Sale.	Amount.
Allouez, Mich.	Sept. 26	.....	1.50
Andes, Nev.	July 11	Aug. 1	.10
Bullion, Nev.	June 24	July 14	.05
Challenge Con., Nev.	July 13	Aug. 3	.10
Chollar, Nev.	July 13	Aug. 3	.10
Colo. Hydraulic, Cal.	July 18	.....	.08
Savage, Nev.	July 15	Aug. 5	.10
Shenandoah, Cal.	July 11	.....	.02

DIVIDENDS.

Company.	Latest Dividend. Payable.	Rate.	Total.	Total to date.
†Am. Sm. & R., pf.	July 5	1.75	875,000	15,016,553
†Am. Sm. & R., com.	July 26	1.25	625,000	1,875,000
C., K. & N., Colo.	June 25	.01	14,319	128,871
†Calumet & Hecla.	June 31	10.00	$1,000,000	$85,350,000
†Cen. Coal & C., com.	July 15	1.50	76,875	781,875
†Cen. Coal & C., pf.	July 15	1.25	23,437	867,183
Empire St. & I., pf.	July 1	1.50	44,550	411,900
*Four Oil. Cal.	July 15	.01	2,087	70,971
†General Chem., pf.	July 1	1.50	150,000	3,025,178
†Guggenheim Explor.	July 5	1.75	183,750	1,102,500
Horn Silver, Utah.	June 30	.05	20,000	5,402,000
New Idria, Cal.	July 1	.30	30,000	640,000
Oil City Petrol., Cal.	July 1	.00½	2,500	10,000
†Phil. Nat. Gas, com.	Aug. 1	.75	398,888	4,613,495
‡Sloss S. St. & I., pf.	July 1	1.75	117,250	2,087,750
†Tenn. C. I. & RR., pf.	Aug. 1	2.00	4.960	321,984
Tetro, Utah.	July 1	.01	3,000	3,000
Utah Con., Utah.	July 15	1.50	450,000	2,586,000
†Va.-Car. Chem., pf.	July 15	2.00	360,000	7,860,869

* Monthly. † Quarterly. ‡ Semi-annually.

STOCK QUOTATIONS

NEW YORK.

Company.	Par val.	June 15 H.	June 15 L.	June 16 H.	June 16 L.	June 17 H.	June 17 L.	June 18 H.	June 18 L.	June 20 H.	June 20 L.	June 21 H.	June 21 L.	Sales
Alpha, g. s	1					10								500
Amalgamated, c..	$100	50	49¼	49¾	49⅜	49⅞	49⅞	50½	49¾	50⅛	51¼	50⅛	50	59,970
Anaconda, c	25	72¼	72							74⅛	74			500
Belcher, s	3													
Best & Belcher, s..	3							1.15						100
Bullion, s	1											18		200
Caledonia, s	1					73								200
Challenge, s	2½							14						200
Chrysolite, s. l....	50			8										1,100
Confidence, s	3											95		100
Con.Cal.&Va., g.s.	2½			1.30		1.30				1.30				400
Con. Imperial s ..	1													
Cripple Creek, g..	1					7								1,000
Elkton, g	1	68	67			68				68	67			1,000
El Paso, g	1													
Exchequer, s	1									45				300
Gold Dollar	1									4½				1,000
Greene Con., c....	10	14¼	15⅛	15⅛	15	15⅛	14⅞	15	14¾	15	14¾	15	14¾	5,932
Homestake, g	100					54								10
Horn Silver s l ..	20													
Isabella, g	1	29	28	30				26				30		1,500
Justice, s	21													
Little Chief s l...	50			5								5		600
Mexican s	3	1.20		1.30		1.25		1.30				1.25		800
Mollie Gibson	5			6										500
Moon Anchor, g..	5											8		500
Moulton, g	25											19		100
Ontario, s. l	100													
Ophir, s	3			4.00						3.80		3.90		300
Overman, s	2													
Pharmacist, g....	1													6,200
Phœnix, g	1	13	10	13	12			13		14		15	14	6,100
Portland, g	1					1.60				1.65		1.65		400
Potosi, s	1			10										300
Savage, s	3													
Sierra Nevada s ..	3													
Small Hopes, s. l.	20			20						22				300
StandardCon.,g.s.	10			2.40	2.35									200
Syndicate, g	1	4												500
Tennessee, c	25													
Union Con., g. s...	100	44												200
Union Copper	10	1/16	¾			1/16	¾					¾		950
United Copper	100													
Utah, s	1							15				15		1,000
White Knight, c....	10													
Yellow Jacket, s..	3									25				200

c—Copper. g—Gold. l—Lead. s—Silver. Total sales, 87,362 shares

BOSTON, MASS.

Company.	Par val	June 15 H.	June 15 L.	June 16 H.	June 16 L.	*June 17 H.	*June 17 L.	June 18 H.	June 18 L.	June 20 H.	June 20 L.	June 21 H.	June 21 L.	Sales
AdventureCon.,c	$25	1¼								1				80
Allouez, c	25			6	5½			6	5¾	6⅛	5⅞	6⅛		1,485
†Amalgamated,c.	100	49⅞	49⅜	49⅝	49⅜			50¼	49¾	50⅜	50¼	50⅜	50	5,773
Am. Z. L. & Sm..	25													
Anaconda, c. s...	25									18½	17¾			102
Arcadian, c	25													
Atlantic, c	25	8		8½						8	7¾	8		172
Bingham Con	50	21¼	21⅛							21⅝	20¾	21⅝	21⅝	1,278
Bonanza Dev. g..	10													
Calumet & Hecla	25	4.50		4.55				4.50		4.55		4.55		9
Centennial, c	25	19⅛		19⅛						20¼	20	20	19¾	1,080
†Central Oil	25	10¼	8¼									10	9⅞	2,625
Con. Mercur, g..	5	27		27				25		24	20			679
Copper Range	100	42⅝	42¼	42⅝	42⅛			42⅛	42¼	43¼	42⅜	43⅞	42¾	4,693
†Daly West, g.s.l	20	24		24				24		24	23¾	24		449
Dominion Coal...	100	54	51½	50½	49			52	51¾	53		53	52	1,120
Preferred														
Dominion I. & S.	100	7⅞	7½					8¼	8	8	7½			285
Elm River, c	12													
Franklin, c	25			7				7		7¼	7	7⅛	7	311
Granby Con	10	3⅛	3⅛					3⅛				3⅜		1,405
Guanajuato Con.	5	1⅛								1		1½	1⅛	125
Isle Royal Con..	25							7½		8⅛	7¾	8	7¾	1,784
Mass Con., c	25	3½		3½						4		4		770
Mayflower, c	25									75				10
Michigan, c	25			3½						3¾	3½	3¾		275
Mohawk, c	25	40¼		40¼	40			40¾	40½	41⅞	40¼	41⅜	41	1,542
Mont. Coal & C ..	25									4				100
Mont'l & Boston.	5													
New Idria, q	5													
Old Colony, c	25	75												325
Old Dominion, c.	25									13½	13	13⅝		380
Osceola, c	25			60¼	54½					62⅜	61½	62½	61¼	1,458
Parrot, s. c	10	25						25		25½	25	25½	25	1,208
Phœnix Con, c	25									1¾	1⅜	1½		485
Quincy, c	25							82	80½	86	84	86	85	143
Rhode Island, c..	25							85		76	50			132
Santa Fe, g. c	10													
Shannon, c	10	6⅝	6¼	6⅜	6					6¼	5⅜	5	5½	4,820
Tamarack, c	25	91½	90							92½	90	94	85	152
Tecumseh, s	25									25				230
Trinity, c	25	3¾						3⅞		3⅞		3⅞		35
United States, g..	10	20		19⅞				20		21⅛	20	21¼	20½	6,847
U. S. Coal & Oil..	25	10⅛						10	5⅞	10⅛	9¾	10¼	10⅛	960
Utah Con., g. c...	5	35⅞	35⅞	35¾	35¾			38⅛	35½	38⅜	36⅛	39¾	37⅝	19,486
Victoria, c	25			2½						2⅛				160
Winona, c	25	5⅝								6	5⅝	5¾		405
Wolverine, c	25			72						73	72	73		59
Wyandot, c	25							50		75				60

c—Copper g—Gold. l—Lead. q—Quicksilver. s—Silver. Total sales, 63,678 shares.
*Holiday.

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	June 15 H.	June 15 L.	June 16 H.	June 16 L.	June 17 H.	June 17 L.	June 18 H.	June 18 L.	June 20 H.	June 20 L.	June 21 H.	June 21 L.	Sale
Allis-Chalmers....	$100									8½		11⅜		50
Preferred	100											41⅜		100
Am. Agr. Chem ..	100													
Preferred	100													
Am. Sm. & Ref....	100	54	53½	53⅞		54	53⅝	53⅝		53⅞	53¾	53¾	53½	4,838
Preferred	100	98⅜	98¼	98⅛	98¼	98½	98	98⅜	98	98¾	98¼	98⅞	98¾	8,535
Col. Fuel & I....	100	30		30	29½	30	29½					30		610
Col. & H. C. & I....	100									9⅝		9⅝	9	980
Crucible Steel....	100			41½	4	4¼	4	4						779
Preferred	100	34¾	34½			33		33		33				554
General Chem....	100													
Preferred	100													
Mong. R. Coal....	50													
Preferred	50	21				22	21¾	21¾		21¾	21⅜			280
National Lead....	100	21⅝	21⅜	21	20¾	21	20¼			21	20⅝	20⅞	20⅜	4,150
Preferred	100													
Phila. Nat. Gas....	100									38		38⅝		110
Preferred	100													
Pittsburg Coal....	100			14¾		14¾				15		15		141
Preferred	100	55¼	54¾			55¾		57	55⅞	58	56¾	58		785
Republic I. & S....	100	6⅜	6¼			6½				6⅜		6½		500
Preferred	100			42⅛		40¼				41½		41½		530
Sloss-Shef S. & I...	100					38								100
Preferred	100									83				200
†Standard Oil....	100	626	625	625		626	623			626	624½	630	626¼	73
Tenn. C.I. & R.R....	100	35	34⅞					34⅞		35½	34¾	35		1,130
U.S. Red. & Ref....	100													
U.S.Steel Corp.....	100	9⅝	9¼	9¼	9⅛	9⅛	9	9⅛	9	9¼	9⅛	9⅛	9¼	9,683
Preferred	100	55	54⅛	54⅜	54¼	54⅝	53⅞	54⅜	54¼	55¼	54⅜	55¾	55	79,48
Va.-Car Chem.....	100			28		26¾	26½			25½				50
Preferred	100	100½	100¼	100½								101⅝		39

*Pittsburg exchanges; all others, New York. Total sales, 114,875.

COLORADO SPRINGS, COLO.

Company.	Par Val	June 11 H.	June 11 L.	June 13 H.	June 13 L.	June 14 H.	June 14 L.	June 15 H.	June 15 L.	June 16 H.	June 16 L.	June 17 H.	June 17 L.	Sales
Acacia	$1	7¾	5¾	7	5⅞	7	6	6¼	6	7	6	7	6½	
Anaconda	5	11¼		14	11½	14	12	14	12	12		12	6	10,000
Colo. City & M....	1	2½	2	2⅝	1⅞	2¼	2	2⅛	2	2⅛	2	2⅛	2¼	
C. K. & N	1	35	30	35	30	34	31½	35	30	34	30	34	30	
Cripple Ck. Con...	1	8⅛	7⅞	8¼	7⅝	8¼	8	8⅛	7⅞	8¼	8	8⅛	8	20,000
Des Moines	1	2¼	1½	2¼	1⅝	2¼	1½	2¼	1½	2¼	1⅝	2¼	1½	
Doctor-Jack Pot..	1	4¼	4⅛	4¼	4	4¼	4	4⅜	4⅛	4⅜	4¼	4⅜	4¼	6,000
Elkton Con	1	67½	66⅜	69½	67½	70	69	70	69	70	69¾	69½	69	12,533
El Paso	1	86¼	85½	86½	86⅛	88	87⅜	86½	85⅞	86⅝	85½	86⅜	86	40,422
Gold Dollar Con..	1	4⅛	4	5	4⅞	5	4⅞	5	4⅞	5	4¾	5	4⅝	12,000
Gold Sovereign...	1	5⅛	5	5⅜	5⅞	6	5⅞	6¼	6	6¼	6	6⅛	6	30,000
Golden Cycle	1	48	43	48	43			60	40	50	40	50	40	1,000
Golden Fleece	1													
Hart	1	3½	2	3	2					4	2	4	2	
Isabella	1	29¾	28¼	28½	28	29½	29¼	30	28	30	29	30	29¼	4,000
Jack Pot	1	9	4	9	4¾	6	4	6	4	6	4	6	4	
Keystone	1			5	4¾	5	4⅞	5	4¾	4⅞	4¾	5	4¾	5,000
Last Dollar	1	40		46		46		45		40		40		
Lexington	1	4	3½	3⅞	3	3¾	3¼	3¾	3⅜	3¾	3¼	3¾	3	
Little Puck	1	3½	3¼	3½	3⅜	3⅜	3½	3½	3⅜	3½	3⅜	4½	4	29,000
Mollie Gibson	1	6		6		6		6		6		6		
Moon-Anchor	5	7½	7	8	6⅞	8½	7	8	7	9	6	8	6¾	5,000
New Haven	5	3½	2⅞	3½	2⅞	3¼	3	3½	2⅞	3½	3	3¼	2⅞	
Old Gold	1	9⅜	9	9⅜	9	9⅜	9	9¼	9	9⅜	9	9⅜	9	1,000
Pharmacist	1	3¾	3⅝	3¾	3¼	3¼	3⅜	4	3¼	3⅜	3½	3⅜	3½	4,000
Pinnacle	1	3		3		3		3		3		3		
Portland	1	1.67	1.63	1.62½	1.61	1.76		1.75		1.70	1.50	1.71	1.69	2,500
Vindicator Con..	1	65	61	65	60	60		60		60		66	60	
Work	1			7½	6⅞	7½	7	7¼	6¾	7¼	6¾	7½	6⅞	1,000

Total sales, 183,455 shares.

SAN FRANCISCO.

Company.	Location.	June 9 H.	June 9 L.	June 10 H.	June 10 L.	June 11 H.	June 11 L.	June 13 H.	June 13 L.	June 14 H.	June 14 L.	June 15 H.	June 15 L.	Sal
Golden Anchor..	Nev..													
MacNamara	Nev..	50	35	48	43	53	47	53	47	50	44	56	41	134047
Mont. Tonopah..	Nev..	2.07½	1.92½	2.10	2.07½	1.15	2.05	2.07½	2.02½	2.10	2.05	2.15	2.07½	15,054
Stand'dCorMgCo	Cal...													
Ton. Belmont....	Nev..	68	67	67	66	67		68		70	69	73	71	9,00
Ton. Midway	Cal...	42	40	43	40	41	40	39		43	39	44	49	24,194
Ton. Mg. Co	Nev.			8.87½								9.25		120
Ton. North Star.	Nev..	28				28				28		28	27	2,701
Ton. & Salt Lake	Nev..													

Total sales, 185,916 shares.

COLORADO SPRINGS (By Telegraph).

Company.	June 20 H.	June 20 L.	June 21 H.	June 21 L.
Anaconda	.16	.11⅛	.16	.12
Cripple Ck Con..	.08	.07⅜	.08	.07⅝
C. K. & N	.35	.30		
Doctor-Jack Pot..	.04½	.04⅜	.04½	.04¼
Elkton Con	.70	.69	.69⅜	.68⅜
El Paso	.87	.85⅜	.88½	.85½
Gold Dollar Con.	.05	.04½	.04⅝	.04¼
Gold Sovereign...	.06¼	.06⅛	.06⅜	.06
Isabella	.29½	.28		

Company.	June 20 H.	June 20 L.	June 21 H.	June 21 L.
Jack Pot	.06	.04		
Last Dollar	.40			
Mollie Gibson....	.06		.05¼	.04½
Moon Anchor	.08	.06⅞	.08	.07
Old Gold	.09⅜	.09⅛	.09⅜	.09⅛
Pharmacist	.03¾	.03⅛	.03½	.03⅛
Portland	1.74	1.60	1.74	1.50
Vindicator	.60		.75	.60
Work	.07¼	.06¾	.07⅛	.06⅝

*Quotations not reported.

SAN FRANCISCO (By Telegraph).

Company.	June 20.	June 21.
Belcher	.24	.24
Best & Belcher	1.25	1.25
Caledonia	.70	.71
Challenge Con	.14	.14
Chollar	.11	.11
Confidence	.95	.90
Con. California & Virginia..	1.20	1.25
Crown Point	.14	.15
Gould & Curry	.22	.22
Hale & Norcross	.70	.71
Mexican	1.20	1.15
Ophir	3.85	3.75
Overman	.22	.23
Sierra Nevada	.38	.37
Union Con	.42	.44
Yellow Jacket	.22	.24

PHILADELPHIA, PA

Company	Par val.	June 15 H.	June 15 L.	June 16 H.	June 16 L.	June 17 H.	June 17 L.	June 18 H.	June 18 L.	June 20 H.	June 20 L.	June 21 H.	June 21 L.	Sales
Am. Cement	10					8				8		8		499
Cambria Iron	50											48		200
Cambria Steel ..	50	19	18⅞	19	18⅞	19	13⅞	19		19⅛	19	19⅜	18⅞	1,498
Int. Smokel's Pd.	100	15	14¾	15⅜	15½									770
Int Sm. Pd. Pfd.	100													
Lehigh C. & N...	50	75½	75	76	75¼			78¾	78	80¾	78½	81½	79	3,976
Mont. Tonopah..	1					2.19				2.25		2.50	2.40	
Philadelphia	50	38½	38¼			38½				38⅞	38¼	38¾	38⅝	2,427
Phila. Pfd	50											44½		15
Tonopah	100	9	8⅞	8⅞	8½	8½	8¼	8½	8⅛	8⅛	7¾	8	7¾	
Tonopah, Belm..	1			71	70			75		75		77	75	
United Gas & C'l.	50	82	82½	83	82¾			83		83	82¾	84½	83	1,398
Westmoreland C.	50			78		78¾				80				77

Total sales 13,860.

STOCK QUOTATIONS

ST. LOUIS, MO.* June 18.

Name.	Par Val.	Prices. Bid.	Ask.	Name.	Par Val.	Prices. Bid.	Ask.
Am.-Nettie, Colo...	$10	$0.10	$0.15	Columbia Lead, Mo.	$10	$3.50	$4.00
Catherine Lead, Mo.	10	1.50	2.00	Con. Coal, Ill.....	100	16.00	18.00
Central Coal & C....	100	59.50	61.00	Doe Run Lead Mo.	100	110.00	115.00
Central C. & C., pf..	100	70.00	71.00	Granite Bimet. Mt..	10	.35	.41
Central Lead, Mo...	100	110.00	115.00	St. Joe Lead, Mo,...	10	14.50	16.00

*By our Special Correspondent.

SALT LAKE CITY.* June 18.

Company	Par Val	High	Low	Sales.	Name of Company	Par Val	High	Low	Sales.
Ajax	10	.10½	.10¼	1,000	May Day	¼	.02	.01⅝	5,200
Butler Liberal	1	.13½	.12¾	10,045	Martha Wash.			⅛	17,000
Carisa	1				N. Y. Bonanza	1	.04½	.04¼	7,000
Century	1	.75	.68½	1,520	Petro		.07½	.07⅛	1,000
Con. Mercur	5	.24½	.24	549	Sacramento	5	.15⅞	15½	11,000
Daly Judge	20	4.25	4.00	208	Silver King	20			
Daly West	1	23.90	23.80	110	Star Con	1	.12	.11¼	1,700
Grand Central	1				Swansea		.41	.35	500
Ingot		½	½	2,000	Tetro	1	.35½	.34½	9,400
La Rene		.06¼	.06	7,000	Uncle Sam, Con	1	.14¾	.13¾	17,410
Little Chief	1	.00½	.00⅝	2,000	Utah				
L. Mammoth	1	.16	.17½	355	Victor Con	1			
Mammoth		1.11	.90	355	Yankee Con	1	.34	.33¾	3,700

*By our Special Correspondent. All mines are in Utah. Total sales, 99,062 shares.

DULUTH, MINN. May 28.

Company	Par Val.	Bid.	Asked.	Company	Par Val.	Bid.	Asked.
Calumet & Arizona	$10	$100	$105	Lake Sup. & Pitts Dev.	$10	$145	$150
Calumet & Bisbee	10	3.00	4.50	Pitts. & Duluth Dev.	15	33.50	36.00
Calumet & Cochise	10	5.00	5.50	Shakespeare	10		.20
Calumet & Pittsburg	10	25.00	28.00	United Mexican	10		.50
Higgins Development	10	2.00	2.50	Wolverine & Arizona	10	3.50	
Junction Development	15	18.00	21.00	Yaqui	10		1.00

TORONTO, ONT. May 21.

Company.	Par val	Prices. High.	Low.	Company.	Par val	Prices. High.	Low.
Black Tail, g	$1			Mountain Lion, g	$1		
Cariboo McKin	1			Payne, s. l	1	.13	.09
Cariboo-Hydr	1			Rambler Carib	1	.28	.22
Center Star, g. s	1	.28	.25	St. Eugene, g. s	1	.50	.42
				War Eagle Con	1	.14	.10
				White Bear	1	.04½	.03½

g—Gold. l—Lead. s—Silver.

MEXICO. June 3.

Company.	Shares Issued	Prices, Mex. Bid.	Ask.	Company.	Shares Issued.	Prices, Mex. Bid.	Ask.
Durango:				Trompillo	1,300	$1,760	$1,780
Ca. Min. de Penoles	2,500	$2,500	$3,000	San Rafael y An., aviada	1,200	715	720
San Andres de la Sierra	200	10,000		Soledad, aviada	670	720	735
Guanajuato:				Sorpresa, aviada	960	265	275
Angustias, Pozos	2,400	40	45	**Mexico:**			
Cinco Senores y An., aviadoras	2,000	41	45	Alacran	2,400	20	28
Cinco Senores y An., aviada	400	41	45	Aldebarren	2,000	55	60
Providencia, San Juan de la Luz	6,000	45	55	Buen Despacho	3,000	45	55
Queensland y Australia	300	10	20	Dos Estrellas	3,000	2,150	2,200
Guerrero:				La Esperanza (El Oro.)	3,000	1,500	1,500
Delfina, 1st serie	2,500	45	50	La Reformia, aviadores	2,000	38	42
Delfina, 2nd serie	2,500	35	40	Santa Ana, Esperanza	2,400		90
Garduno y Anexas	7,200	30	40	**Michoacan:**			
Hidalgo:				Luz de Borda, aviadora	3,000	24	30
Amistad y Concordia	9,000	81	82	Luz de Borda, aviado	1,000	16	18
Carmen, aviada	1,100	90	100	Santiago y An., Tlal.	4,000	3	5
Guadalupe Fresnillo Mill	1,000	170	200	**Nuevo Leon:**			
Guadalupe Fresnillo Mine	1,400	70	80	La Fraternal	1,000	590	620
La Reina y An., aviadora	5,600	2	4	Norias de Bajan	1,000	880	920
Luz de Maravillas, aviadas	1,100		20	**San Luis Potosi:**			
Maravillas y An., aviador	1,680	110	150	Concepcion y An	3,000	54	60
Maravillas el Lobo	1,000	130	180	El Barreno, aviadora	2,000	284	66
Palma y An., aviador	1,800	4	8	Sta. Maria de la Paz	9,000	170	173
Refugio, aviada	12,800	680	740	San Diegoy Annexas	2,400	8	10
Santa Anay An., aviadora	800	50	70	**Zacatecas:**			
Santa Anay An., aviada	600	25	35	Asturiana y An	2,500	38	45
Sta. Gertrudis y An., aviadas	9,600	13½	15	Candelaria y Pinos	2,500	20	25
Sta. Gertrudis y An., aviadora	28,800	81¾	82½	Esperanza y An	2,400	6	8
Santo Tomas Apostol aviadoras	5,100	2	3	Lourdes	2,500	15	25
San Felipe de Jesus, aviadora	3,600	14	16	Luz de Minillas, pagadoras	2,000		
San Felipe de Jesus, aviada	1,200	6	10	Nueva Quebradilla, aviadoras	2,400	15	25
San Rafael y An.,				Nueva Quebradilla, aviadas	600	15	25
				San Carlos y Annexas	2,500	58	62
				Sta. Maria de Gaud	2,500	78	85
				Miscellaneous:			
				Bartolome de Medina	2,000	92	95
				Naica (Chihuahua.)	100	11,000	13,000
				Natividad (Oaxaca) aviadora	1,800	950	1,000
				San Francisco Hac	6,000	74	78
				Union Hacienda	3,000	290	313

LONDON. June 10.

Company.	Shares Issued.	Par value. £. s. d.	Latest dividend. Amt. s. d.	Date.	Quotations. Buyers. £. s. d.	Sellers. £. s. d.
American:						
Alaska-Treadwell	200,000	5 0 0	1 6	Apr., 1904	4 10 0	4 15 0
*Anaconda	1,200,000	5 0 0	2 0	May, 1904	3 11 3	3 13 9
Camp Bird	820,000	1 0 0	9	May, 1904	1 7 6	1 8 9
Copiapo	112,500	2 0 0	6 10	May, 1903	17 6	1 2 6
*De Lamar	80,000	1 0 0	1 6	May, 1904	11 3	13 9
El Oro	1,080,000	1 0 0	9	Jan., 1904	1 2 6	1 5 0
Frontino & Bolivia	128,682	1 0 0	3 0	July, 1901	6 3	8 9
Le Roi	200,000	5 0 0	5 0	Nov., 1899	15 0	17 6
Le Roi No. 2	120,000	5 0 0	1 0	June, 1904	15 0	17 6
Montana	657,128	1 0 0	6	April, 1899	9	1 3
Palmarejo & Mexican	445,000	1 0 0	rts.	April, 1903	7 0	8 0
Standard	500,000	4 0	2½	Sept., 1903	2 6	3 6
Stratton Independence	1,000,007	1 0 0	6	Dec., 1903	3 6	4 0
St. John del Rey	546,265	1 0 0	6	Dec., 1903	13 0	14 0
Tomboy	300,000	1 0 0	1 0	June, 1902	6 0 0	6 5 0
Ymir	200,000	1 0 0	1 0	Mar., 1902	1 3	3 9
European:						
Linares	15,000	3 0 0	5 0	Apr., 1904	3 5 0	3 6 3
Mason & Barry	185,172	1 0 0	7 0	May, 1904	2 17 6	3 2 6
*Rio Tinto	325,000	5 0 0	37 6	May, 1904	50 17 6	51 2 6
*Rio Tinto, preferred	325,000	5 0 0	2 6	May, 1904	6 0 0	6 5 0
*Tharsis	625,000	2 0 0	7 0	May, 1904	4 2 6	4 7 6
West Australian:						
Associated	495,388	1 0 0	2 6	July, 1904	3 5 0	3 6 3
Cosmopolitan	400,000	1 0 0	1 0	Apr., 1904	10 6	11 6
Golden Horseshoe	300,000	5 0 0	6 0	Apr., 1904	7 15 0	7 17 6
Great Boulder	1,750,000	2 0	1 0	June, 1904	1 7 9	1 8 3
Gt BoulderPersever'ce	1,400,007	1 0 0	1 3	May, 1904	16 6	17 0
Great Fingall	250,000	1 0 0	7 0	Apr., 1904	7 16 3	7 18 9
Ivanhoe	200,000	5 0 0	7 6	Apr., 1904	7 17 6	8 0 0
Kalgurli	120,000	1 0 0	2 6	Apr., 1904	5 8 9	5 11 3
Lake View	250,000	1 0 0	rts.	Aug., 1902	1 5 0	1 7 6
Oroya-Brownhill	450,000	1 0 0	3 0	June, 1904	3 11 3	3 13 9
Miscellaneous:						
*Brilliant Central	100,000	1 0 0	2 0	June, 1904	3 0 0	3 5 0
Briseis	600,000	1 0 0	.. ..		8 0	8 6
Broken Hill	960,000	8 0	1 0	May, 1904	1 13 5	1 14 7
Mt. Lyell	275,000	3 0 0	1 3	June, 1904	15 6	16 6
*Mt. Morgan	1,000,000	1 0 0	3	May, 1904	2 5 0	2 7 6
*Waihi	497,412	1 0 0	4 6	June, 1904	5 12 6	5 15 0
Indian:						
Champion Reef	513,832	10 0	1 3	May, 1904	1 14 0	1 15 0
Mysore	566,043	10 0	5 6	Mar., 1904	6 10 0	6 12 6
Nundydroog	484,000	10 0	1 8	Mar., 1904	1 15 0	1 18 0
Ooregum	343,000	10 0	1 3	Apr., 1904	1 1 9	1 2 11
Ooregum, pfd	240,000	10 0	1 3	Apr., 1904	1 12 6	1 15 0
South African:						
Angelo	600,000	1 0 0	4 0	Feb., 1904	6 18 9	7 1 3
Bonanza	200,000	1 0 0	10 0	Feb., 1904	1 5 0	1 7 6
British South Africa	4,436,019	1 0 0	rts.	May, 1899	1 14 7	1 15 9
Cape Copper	300,000	2 0 0	2 6	July, 1904	3 2 6	3 7 6
Cape Copper, pfd	75,000	2 0 0	2 6	July, 1904	3 2 6	3 7 6
City & Suburban	340,000	4 0 0	8 0	Feb., 1904	6 7 6	6 12 6
Consol. Gold-Fields	2,000,000	1 0 0	.. ..		6 13 9	6 14 3
Crown Reef	120,000	1 0 0	6 0	June, 1904	14 0 0	14 5 0
De Beers, preferred	800,000	2 10 0	10 0	Jan., 1904	18 8 9	18 11 3
De Beers, deferred	1,000,000	2 10 0	15 0	Jan., 1904	19 5 0	19 7 6
East Rand	980,000	1 0 0	5 0	Aug., 1903	7 15 0	7 17 6
Ferreira	90,000	1 0 0	22 6	June, 1904	20 15 0	21 5 0
Geldenhuis	200,000	1 0 0	7 0	June, 1904	5 10 0	5 12 6
Geduld	400,000	1 0 0	rts.	Mar., 1902	6 7 6	6 10 0
Henry Nourse	125,000	1 0 0	10 0	Feb., 1904	8 10 0	8 15 0
Jubilee	50,000	1 0 0	5 0	June, 1904	4 10 0	4 15 0
Jumpers	100,000	1 0 0	2 6	May, 1904	3 0 0	3 5 0
Langlaagte	470,000	1 0 0	2 0	Feb., 1904	3 16 3	3 18 9
May	288,750	1 0 0	3 6	Feb., 1904	4 0 0	4 2 6
Meyer & Charlton	100,000	1 0 0	5 0	Jan., 1904	5 10 0	5 15 0
Modderfontein	290,000	1 0 0	rts.	Apr., 1902	8 17 6	9 0 0
*Namaqua	94,331	2 0 0	3 0	Dec., 1903	2 15 0	3 0 0
New Jagersfontein	200,000	5 0 0	10 0	June, 1904	28 0 0	28 10 0
New Primrose	325,000	1 0 0	3 0	Mar., 1904	3 15 0	3 17 6
Rand	1,796,858	5 0	5 0	June, 1902	10 8 9	10 10 0
Robinson	750,000	5 0 0	6 0	June, 1904	9 10 0	9 15 0
Robinson Deep	950,000	1 0 0	3 0	Jan., 1904	5 7 6	5 10 0
Rose Deep	425,000	1 0 0	3 0	June, 1904	8 5 0	8 10 0
Salisbury	100,000	1 0 0	2 0	June, 1904	1 12 6	1 17 6
Village	400,000	1 0 0	3 0	Feb., 1904	6 10 0	6 15 0
Wemmer	80,000	1 0 0	12 6	June, 1904	11 0 0	11 10 0

*Ex-dividend.

LONDON (By Cable.)*

Company.	June 15 £.	s.	d.	June 22 £.	s.	d.	Company.	June 15 £.	s.	d.	June 22 £.	s.	d.
Anaconda	3	15	0	3	5	0	†Esperanza	1	1	7½	1	1	6
Camp Bird	1	7	6	1	7	4½	Modderfontein	7	18	9	8	18	9
Con. Gold Fields	6	11	3	6	17	6	Rand Mines	10	10	0	10	7	6
De Beers	19	5	0	19	2	6	Rio Tinto	51	13	9	52	3	9
East Rand	7	15	0	7	15	0	Simmer & Jack	1	13	9	51	13	9
El Oro	1	3	1⅛	1	3	1⅛	Tomboy	1	5	0	1	3	9

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York. †Ex-dividend.

PARIS. June 2.

Company.	Location.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Closing. Fr.
Anzin, Coal	France		200.00	5,500.00	5,525.00	
Boleo, c	Lower Cal.	12,000,000	500	62.50	1,945.00	1,940.00
Champ d'Or, g	S. Africa	3,375,000	25	3.75	18.50	19.75
Courrieres, Coal	France	600,000	500	110.00	2,850 00	2,840.00
Fraser River, g	Brit. Col.	250,000	25		5.50	5.50
Huanchaca, s	Bolivia	40,000,000	125	2.50	89.00	79.50
Laurium, z. l	Greece	16,300,000	500	25.00	325.00	318.00
Malfidano, z	Italy	12,500,000	500	50.00	595.00	590.00
Metaux, Cie. Fran. de	France	25,000,000	500	22.50	470.00	470.00
Mokta-el-Hadid, i. l	Algeria	18,312,000	500	40.00	886.00	880.00
Nickel, n	N. Caledonia	15,000,000	250	22.50	535.00	540.50
Penarroya, Coal	Spain		500	45.00	1,069.00	1,060.00
Vielle Montagne z	Belgium	9,000,000	30	30.00	688.00	690.00

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. o—Oil. s—Silver. z—Zinc.